Integrating Murine Gene Expression Studies to Understand Obstructive Lung Disease due to Chronic Inhaled Endotoxin

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**Full Title** Integrating murine gene expression studies to understand obstructive lung disease due to chronic inhaled endotoxin

**Short Title** Lung disease due to chronic endotoxin exposure

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Abstract

RATIONALE: Endotoxin is a near ubiquitous environmental exposure that has been associated with both asthma and chronic obstructive pulmonary disease (COPD). These obstructive lung diseases have a complex pathophysiology, making them difficult to study comprehensively in the context of endotoxin. Genome-wide gene expression studies have been used to identify a molecular snapshot of the response to environmental exposures. Identification of differentially expressed genes shared across all published murine models of chronic inhaled endotoxin will provide insight into the biology underlying endotoxin-associated lung disease.

METHODS: We identified three published murine models with gene expression profiling after repeated low-dose inhaled endotoxin. All array data from these experiments were re-analyzed, annotated consistently, and tested for shared genes found to be differentially expressed. Additional functional comparison was conducted by testing for significant enrichment of differentially expressed genes in known pathways. The importance of this gene signature in smoking-related lung disease was assessed using hierarchical clustering in an independent experiment where mice were exposed to endotoxin, smoke, and endotoxin plus smoke.

RESULTS: A 101-gene signature was detected in three murine models, more than expected by chance. The three model systems exhibit additional similarity beyond shared genes when compared at the pathway level, with increasing enrichment of inflammatory pathways associated with longer duration of endotoxin exposure. Genes and pathways important in both asthma and COPD were shared across all endotoxin models. Mice exposed to endotoxin, smoke, and smoke plus endotoxin were accurately classified with the endotoxin gene signature.

CONCLUSIONS: Despite the differences in laboratory, duration of exposure, and strain of mouse used in three experimental models of chronic inhaled endotoxin, surprising similarities in gene expression were observed. The endotoxin component of tobacco smoke may play an important role in disease development.
**Introduction**

Endotoxin (or lipopolysaccharide, LPS) is a cell-wall component of gram-negative bacteria and is ubiquitous in the environment. Endotoxin has been detected in household dust at low or moderate concentrations[1], and at much higher concentrations in occupational settings such as in swine farms, poultry houses, sewage treatment plants, humidified buildings, and processing of organic materials - in particular cotton[2]. The relationship between endotoxin exposure and the development of asthma is conflicting, with studies suggesting a protective effect of endotoxin in early childhood exposure on the development of asthma [3] while later exposure suggest that endotoxin exposure is associated with both asthma diagnosis and severity [1]. Studies in cotton textile workers have demonstrated the development of an asthma-like syndrome with reversible airflow obstruction termed byssinosis after several years of exposure, while longitudinal studies have demonstrated that with decades of exposure there is an accelerated decline in lung function consistent with chronic obstructive lung disease (COPD), even in the absence of cigarette smoke exposure[4]. More broadly, exposure to biomass fuel has been cited as a major cause of non-tobacco related obstructive lung disease, with roughly 3 billion people exposed worldwide[5,6]. While prior studies on biomass fuel and COPD have focused on the role of particulate matter a recent study noted high levels of airborne endotoxin (up to 365 EU/m^3) in homes burning biomass fuel, with higher endotoxin levels noted in less processed solid fuels such as dried animal dung[7]. Intriguingly, bioactive LPS has also been detected in cigarette smoke, and it has been estimated that the amount of endotoxin delivered from smoking one pack of cigarettes a day is equivalent to that experienced daily by cotton textile workers at risk for byssinosis[8].
The mechanisms whereby endotoxin might protect against, or lead to obstructive lung
disease remain unclear, and the phenotype of obstructive lung disease (reversible
airflow obstruction in asthma vs. irreversible airflow obstruction in COPD) related to
inhaled endotoxin has not been well characterized. A poorly understood and
understudied overlap syndrome between asthma and COPD is seen in clinical practice,
where patients at times may exhibit reversible airflow obstruction but at other times might
present with irreversible airflow obstruction[9].

While most animal models of COPD utilize inhaled endotoxin as a model for acute
COPD exacerbations rather than for the development of chronic COPD over longitudinal
exposure [10], several experimental animal models have demonstrated that long-term
exposure to inhaled endotoxin leads to increased airways resistance and hyper-reactivity
to methacholine challenge [11-14] as well as histologic evidence of emphysema [15,16]
and airway narrowing associated with fibroproliferation[17]. Several groups have used
microarray technology to characterize the pulmonary gene expression profile associated
with chronic inhaled endotoxin. Airflow obstruction has been noted in these models
[15,17-19], and pulmonary gene expression profiling has demonstrated over-expression
of genes such as serum amyloid A 3(Saa3), matrix metalloproteinase 12 (MMP-12), and
lymphocyte antigen 6 complex locus I (Ly6i), a cell surface marker with unknown
function found on the surface of T and immature B cells.

However, to date no studies have examined the agreement between model systems at
the gene or pathway level. Microarray data generated in different laboratories may vary
greatly based on strain of mouse and endotoxin used, different exposure protocols, and
different array platforms [20,21]. In these situations, confirmation of findings based on
agreement between results from other groups represents an important method of validation[22].

In this study we hypothesized that a combined analysis of gene expression microarray data sets from all available experimental murine models of chronic inhaled endotoxin would identify a shared, robust signature at both the gene and pathway level. We further hypothesized that this signature would yield biologic insight into the phenotype of endotoxin-related obstructive lung disease as well as potential dysregulated pathways. Finally, to assess the biological significance of this endotoxin signature in complex endotoxin containing exposures such as cigarette smoke, we used the endotoxin signature that we identified to accurately classify mice exposed to either smoke alone, endotoxin alone, or smoke and endotoxin.

Materials and Methods

Please refer to Supplementary Figure 1 for an overview of the methods.

Identification of studies for inclusion

A murine model of chronic exposure to inhaled endotoxin was developed in our laboratory [23]. A thorough literature search was conducted in order to identify all additional published studies where the study design included murine models of repeated inhaled endotoxin exposure with extraction of RNA from lung homogenate for microarray analysis. A computer search of PubMed with the following search terms "Gene Expression Profiling"[Mesh] AND "Lipopolysaccharides"[Mesh] AND "Lung"[Mesh] to identify candidate studies and also hand-searched references in the articles. Four
experimental models of endotoxin exposure from three distinct laboratories were identified, two from the same laboratory[18,19,23]. The raw gene expression data was obtained from authors through written correspondence.

Normalization and Data Analysis

To ensure consistent processing and annotation of results, re-analysis of all samples was performed using BioConductor/R version 2.13 (www.bioconductor.org) for Affymetrix arrays and the TM4 Microarray Software Suite (http://www.tm4.org/) for Agilent arrays.

For arrays performed on the Affymetrix platform, the quality of the microarray analysis was confirmed using the arrayQualityMetrics package [24]. Background adjustment, quantile normalization, and summarization was performed with RMA using the simpleaffy package [25]. Using the siggenes package, pairwise analysis was performed with significance analysis of microarrays (SAM) [26] to identify statistically significant changes in gene expression. The delta was chosen to limit the output gene list to a false discovery rate (FDR) of less than 5%.

Identification and validation of gene signature

The gene signature for chronic inhaled endotoxin was defined by a common intersect of differentially regulated genes across 3 experiments. As the genes interrogated by each platform differed, each probeset from each platform was mapped to both common MGI gene symbols and common Entrez gene identifiers in order to identify a common intersect of both differentially expressed genes as well as genes interrogated by each microarray platform to identify a common background distribution of genes. As there is no readily available implementation for 3-way hypergeometric tests, 2-way
hypergeometric tests were performed to test for the statistical significance of the overlap between any two studies.

**Comparison of studies at the gene and pathway level**

Annotation of each gene in the gene signature was performed. For each study, genes with significant differential expression were tested for enrichment in pathways from KEGG [27], WikiPathways [28], Reactome [29], and Netpath[30] using a hypergeometric test \( p \leq 0.05 \). The twenty most significant GO terms from each study were merged into a single representation as long as they reached significance in at least one study and visualized as a functional network using Cytoscape [31]. To identify other experimental studies that have differentially expressed genes highly correlated with the identified endotoxin gene signature, we used Nextbio. Nextbio is a proprietary software program that aggregates all publicly available high-throughput microarray data from repositories such as Gene Expression Omnibus (GEO), and performs quality control and significance testing to identify differentially expressed genes.

The system supports the calculation of pairwise gene signature correlation scores using rank-based enrichment statistics between a user-provided input gene signature and ranked gene lists generated from the public data sets within the NextBio corpus[32]. We identified the top 20 experimental conditions with the highest enrichment scores based on the endotoxin gene signature.

**Interrogating biological significance of endotoxin gene signature in tobacco exposure**

Consensus clustering[33] using expression probe intensity values was used to assess the role of the endotoxin-associated gene signature in smoking related lung disease. In
a study in which mice were exposed to air (as a control), LPS alone, smoke alone, and smoke as well as LPS, consensus clustering was performed by subsampling the gene signature (80% of the gene signature, repeated 1000 times) and assessing pairwise consensus values, the proportion that two items occupied the same cluster out of the number of times they occurred in the same subsample. The consensus values were compared to the mean consensus clustering value of 1000 random gene signatures of the same size.

**Results**

Four studies from three different investigators were identified from our literature search[18,19,23]. Characteristics of each study are as detailed in Table 1. There were differences between these studies in the strain of LPS and mouse used as well as the exposure protocol, microarray platform, and lab where the study was conducted. Using a FDR cutoff of 5%, 578, 3083, and 2256 genes were found to be differentially expressed for the Lai (5 day), Meng, and Brass datasets, respectively.

101 genes were found to be differentially expressed in common across all three studies (Figure 1a, Supplementary Table 1). Comparison of the genes mapped by each array revealed that 11,194 genes were present in the array platform across all three studies (Figure 1b). As there is no readily available method to implement 3-way hypergeometric tests, 2-way hypergeometric tests were performed to detect the statistical significance of the overlap between differentially expressed genes in each study. P-values were less than 4.1x10^{-27}, 1.8x10^{-24}, and 4.4x10^{-75} when comparing Brass vs Meng, Brass vs Lai, and Meng vs Lai (Figure 1c).
The genes present in the 101-gene signature are as listed in Table 2. As internal validation, we looked for the presence of proteins encoded by genes present in the well described LPS signaling pathway [34]. Both lbp (LPS binding protein) and cd14 (cluster of differentiation 14) are present, although tlr4 (Toll-like receptor 4) and ly96 (lymphocyte antigen 96, which codes for the protein MD-2) were not. Further validation of the gene signature was performed by confirming that these 101 genes could accurately classify a separate 4\textsuperscript{th} endotoxin and control PBS exposed murine experiment (Lai 8 week model, Supplementary Figure 2).

Functional evaluation of the 101-gene signature was performed. First, annotation of the 101 genes by querying PubMed to determine an association between these genes and published manuscripts on asthma and COPD revealed a significant amount of overlap, with 1024 asthma related publications and 437 COPD related publications (Supplementary Tables 2 and 3). Gene enrichment analysis was performed using DAVID. The Gene Ontology Biological Processes most enriched were response to wounding, inflammatory response, and acute inflammatory response. Using a repository of published experimental results (NextBio [35]), the 101 gene signature was found in a high frequency of murine asthma experiments (Table 3).

A pathway based comparison of the 3 experiments was performed using all known pathways present in Netpath, Wikipathways, Kegg, and Reactome. We used hypergeometric tests to determine pathway enrichment from each experiment and visualized the results with Cytoscape (Fig 2). Multiple similarities at the pathway level were noted, including in the complement, coagulation, and cell adhesion pathways. Within the same experimental model[23], longer duration of LPS exposure (Lai et al
day vs. 8 week) was associated with an increased enrichment of inflammatory pathways (Fig 2a vs. Fig 2b).

Finally, endotoxin is rarely if ever present as an environmental exposure alone but rather is typically present in conjunction with other exposures. Endotoxin is a known component of tobacco smoke[8], and so we sought to determine whether the key genes involved in the response to endotoxin are also important in the response to tobacco smoke. In experiments performed at a single laboratory where mice were exposed to air (as control), endotoxin, tobacco, and endotoxin with tobacco[19] (Table 4), and gene expression profiling was performed on lung homogenate, the 101 gene signature accurately classified endotoxin vs. smoke vs. endotoxin plus smoke exposed mice (Supplementary Figure 3). To assess the stability of the classification as well as to determine whether accurate classification was likely due to chance, we used consensus clustering where the ability of the endotoxin gene signature to accurately classify 1000 bootstrapped samples from the data was compared to a randomly chosen gene signature of equal size. Consensus clustering by the gene signature accurately classified air vs. endotoxin vs smoke vs smoke plus endotoxin exposed groups 99.97% of the time based on 1000 randomly chosen subsamples of probes from all arrays, vs. 78.15% of the time using an equal number of randomly chosen genes (Figure 3). This suggests that the ability of the endotoxin gene signature to classify between these subgroups is better than a random selection of genes.

Discussion

In this study, we made a number of novel observations. First, we identified a common set of 101 genes that was differentially regulated in endotoxin exposed vs. control (PBS
or air exposed) mice across all published models of recurrent endotoxin exposure. A number of genes previously identified as being important in either the pathogenesis or severity of COPD and asthma were present in the signature. In addition, there are a number of other genes identified not previously associated with obstructive lung disease, and may represent candidate genes for further investigation. Of particular interest is the ability of this 101 gene signature to accurately classify endotoxin, smoke, and endotoxin plus smoke exposed mice. While there appear to be some similarities in differential gene expression in response to endotoxin, to cigarette smoke, or to cigarette smoke in conjunction with endotoxin, whether this translates into a similar phenotype of obstructive lung disease cannot be concluded from this observation.

Comparison of these studies at the pathway level revealed additional similarities across these experiments. Notably, when looking within the same experimental model, longer duration of endotoxin exposure led to increased enrichment of inflammatory pathways, which is in contrast to prior studies suggesting that endotoxin tolerance develops in response to repeated endotoxin challenge[36]. While development of tolerance may be related to a number of factors such as the method or route of exposure, it deserves further study as chronic inflammation is thought to play an important role in both asthma and COPD.

While the 101 genes identified represents a small number of genes that are differentially expressed across experimental models as compared to the number of genes differentially expressed within any of the identified experimental models, factors that have previously been identified as being important in the biological response to endotoxin and likely contributed to the heterogeneity in response include significant differences in strain of endotoxin, strain of mouse, exposure protocol, and local practices
of each lab, and likely contributed to differentially expressed genes that were not conserved across experimental models[37,38]. We evaluated the significance of these 101 genes on a number of levels. First, using hypergeometric tests, we demonstrated that this common intersect is highly unlikely due to chance alone. Second, examination of the 101 genes revealed the presence of lbp and cd14, which are well described components of the endotoxin signaling pathway, thus affirming the biologic relevance of this gene signature. Third, this gene signature was able to accurately classify between endotoxin and phosphate buffered saline exposed mice in a distinct experiment not used to generate the gene signature. Finally, at the pathway level, we observed that increasing duration of endotoxin exposure led to increasing enrichment of inflammatory pathways; this was confirmed in a recent publication from our group [23], where increasing duration of inhaled endotoxin exposure was associated with increased IL-6 and decreased IL-10 concentrations in lung homogenate, consistent with a persistent pro-inflammatory profile. The increase in inflammation with prolonged endotoxin exposure was associated with and potentially mediated by an expansion of lung dendritic cells and a reduction in macrophages; thus it was not surprising to see that within the 101 gene signature, there were a number of genes important in antigen presentation that were differentially expressed (such as h2ab-1 which encodes for MHC class II, myeloid chemokines such as ccl6 and ccl9, cathepsins such as ctsz, ctss, ctsb, and psa, and C-type leptin-like receptors such as clec4a2, clec4n, and clec7a). Recent human studies have demonstrated the accumulation of dendritic cells in COPD, with an association between disease severity and level of dendritic cell accumulation.[39,40] On examination of the genes present in the 101 gene signature (Supplementary Tables 1 and 2), a number of asthma associated genes were present, including chi3l1, which was identified in one of the first genome-wide association (GWAS) studies of asthma[41], and il33,
which has been shown in a number of experiments to be important in asthma
development[42,43] and asthma severity[43]. Interestingly, interleukin-33 has also been
found to enhance the endotoxin response of macrophages[44]. Several COPD
associated genes were present, including mmp-12, which has been identified in both
murine studies as being associated with the development of emphysema [45] as well as
in human studies as being associated with the risk of COPD development in smokers
[46]. Of further interest was the identification of fpr2 and saa3. Serum amyloid protein
(SAA) has previously been considered solely an acute phase reactant, and while saa1
and saa2 are expressed primarily in liver and kidney [47], saa3 is expressed in the lung
and has only recently been identified as important in the pathogenesis of glucocorticoid
refractory COPD by opposing organ protective signaling by lipoxins at the ALX/FPR2
receptors [48].

While inhaled endotoxin exposure as a model for de novo COPD development rather
than COPD exacerbations has received little attention, from epidemiologic studies it is
clear that between a quarter to a half of patients with COPD have never smoked [5].
The phenotype of non-tobacco induced COPD as compared to tobacco-related COPD
remains poorly studied. The third National Health and Nutrition Examination Survey
(NHANES III) has suggested that non-smokers account for 24.9% of COPD cases in the
United States [49]; in this study many subjects with non-tobacco COPD previously had a
physician diagnosis of asthma. The multi-center, international BOLD study [50] confirms
these findings, estimating that between a quarter to a fifth of all patients with COPD are
nonsmokers. Indoor biomass fuel exposure and occupational exposure to biologic or
organic dusts in the workplace, both of which has been associated with high levels of
endotoxin exposure, were associated with non-tobacco COPD. As in the NHANES
study, self-reported physician diagnosis of asthma was a strong predictor of non-tobacco COPD. While this may represent disease misclassification by physicians, as the existence of non-tobacco COPD is not widely appreciated, it is also possible that this may relate to the underlying phenotype of non-tobacco COPD that is different from tobacco-related COPD.

The ability of the 101 gene signature to accurately classify between endotoxin, smoke, and endotoxin plus smoke exposed mice, and not just mice exposed to air vs. mice exposed to any endotoxin (whether as endotoxin alone, tobacco smoke [which contains endotoxin], or endotoxin in addition to tobacco smoke) is intriguing. It suggests that genes selected for differential expression between endotoxin and control also play an important role in differential expression between various endotoxin containing exposures. Further examination of expression patterns of the 101 gene signature in this comparison indicate that (Supplementary Figure 3) chi3l1, which is associated with asthma, was upregulated only in endotoxin exposed mice. Conversely, mmp12 was significantly upregulated in all exposure groups although average log2 fold change for smoke vs. control was 4.76, for LPS vs. control was 2.05, and for smoke + LPS vs. control was 2.33. MMP-12 does not appear to have an important role in endotoxin induced inflammation[51], but the interaction between smoke and endotoxin has not been well studied. Of note mmp12 has been associated with the emphysema subtype of COPD[45]. If these gene expression changes are reflected in human exposures and affect downstream clinical phenotypes, it is possible that endotoxin-related COPD has a phenotype more consistent with small airways disease rather than parenchymal disease as seen in tobacco-related emphysema. A further potential implication of the observed differences in mmp12 expression is that smokers who have recurrent bacterial infections
(and thus are exposed recurrently to endotoxin) may be more likely to develop a predominantly airways disease subphenotype of COPD rather than a predominantly emphysema subphenotype of COPD[52].

Strengths of this work include the approach to identify the consistency of gene expression across experimental models, the use of consensus clustering to validate the importance of the identified gene signature against a randomly picked set of genes, and the potential biological applications of the gene signature. This is the first paper to assess the importance of the endotoxin component of cigarette smoke as an exposure using genomic techniques.

We acknowledge that there are several limitations to this work. These studies were performed in murine models and may not be translatable to human disease. Additionally, all of these studies were performed on lung homogenates, and it is difficult to distinguish which cell population contributed to the gene expression signature. Differences between duration of endotoxin exposure were not explicitly addressed as we were looking for agreement across studies; prior work has demonstrated that there are changes in short term vs. long term exposure.[23] Finally, to verify the biologic importance of any one of the identified genes, additional functional work is needed.

To date all treatment trials of COPD have required prior significant tobacco use as an inclusion criteria, and thus we know little about the efficacy of COPD therapies in non-tobacco related COPD. While our work suggests that the endotoxin component of cigarette smoke may be important in disease development, the effect of additional endotoxin in conjunction with tobacco exposure leads to different gene expression changes compared to endotoxin alone. The differentially expressed genes in response
to repeated endotoxin exposure that we identified have been implicated in both asthma and COPD, and based on our pathway analysis, chronic inflammation plays a significant role. There may be other biologically-targeted therapies that may have additional benefit in endotoxin-related obstructive lung disease. Prognosis and treatment implications of this disease may or may not differ from tobacco-related COPD, and deserves further study.

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| Investigator | Endotoxin strain | Mouse strain | Exposure protocol | Microarray platform |
|--------------|------------------|--------------|-------------------|---------------------|
| Brass et al[18] | *Escherichia coli* serotype 0111:B4 | C57BL/6 | • 5 μg/m³ atomized LPS with air as control  
• 4 hrs/day, 5 days/week  
• 1 week duration  
• N=8 per exposure group<sup>a</sup> | Agilent 20K customized mouse array |
| Meng et al[19] | *Escherichia coli* serotype O55:B5 | AKR/J | • 0.5 μg /L nebulized LPS with air as control  
• 1 h/day, 2x/week  
• 3 week duration  
• N=6 for air exposure, N=5 for LPS exposure | Affymetrix mouse genome 430 2.0 array |
| Lai et al[23] | *Pseudomonas aeruginosa* serotype 10 | C57BL/6 | • 2mg/day nebulized LPS with nebulized phosphate buffered saline (PBS) as control  
• 15 min/day, 5 days/week  
• 5 day duration<sup>b</sup>  
• N=4 per exposure group  
• 2mg/day nebulized LPS with nebulized phosphate buffered saline (PBS) as control  
• 15 min/day, 5 days/week  
• 8 week duration*  
• N=4 per exposure group | Affymetrix mouse genome 430a 2.0 array |

<sup>a</sup>In this study, 24 mice were exposed to each condition, with RNA was pooled 3 mice per array, for a total of 8 arrays per experimental condition.  
<sup>b</sup>5 day duration used as part of training set to identify common gene signature, 8 week duration used as test set to determine if gene signature can accurately classify between endotoxin and control phosphate buffered saline (PBS) exposed mice.
Table 2. Mouse genome identifier (MGI) gene symbols for all genes identified in the 101 gene signature.

| Gene Symbol  | Gene Symbol  | Gene Symbol  | Gene Symbol  | Gene Symbol  |
|--------------|--------------|--------------|--------------|--------------|
| 1100001G20Rik| Ch25h        | Fn1          | Ly6i         | Rab32        |
| Acp2         | Chi3l1       | Fpr2         | Matn4        | Reg3g        |
| Atp6ap2      | Chi3l3       | Gatm         | Mmp12        | Rmcs2        |
| B4galnt1     | Clec4a2      | Grn          | Ms4a6d       | Saa3         |
| Bcl2a1a      | Clec4n       | H2-Ab1       | Ms4a7        | Sirpa        |
| Bcl2a1b      | Clec7a       | Havcr2       | Mtm1         | Slec26a4     |
| Bcl2a1d      | Clu          | Hvcn1        | Muc1         | Slec3a2      |
| Bst1         | Cp           | Id2          | Naip1-rs1    | Slec6a20a    |
| C1qb         | Csf2rb2      | IIi30        | Naip2        | Smpdi3b      |
| C1ra         | Ctsb         | IIft3        | Olfm1        | Snx10        |
| C1rb         | Ctsk         | Igf1         | Olr1         | Tgfbi        |
| C2           | Ctsz         | Ii1rn        | Orm1         | Tgfbr1       |
| C3           | Ctsz         | II33         | Orm2         | Tifa         |
| Capg         | Cxcl17       | Itgax        | Per3         | Tlr7         |
| Ccl6         | Cxcl2        | Itgbi2       | Pigr         | Tmem106a     |
| Ccl9         | Cyba         | Itih4        | Pon1         | U46068       |
| Cd14         | Cybb         | Lair1        | Prkcd        | Vnn1         |
| Cd1d1        | Dab2         | Laptm5       | Procr        |              |
| Cd200r1      | Dbp          | Lbp          | Psap         |              |
| Cd68         | Emr1         | Lgals3bp     | Ptgs1        |              |
| Cfb          | F10          | Lrg1         | Rab20        |              |
Table 3. Identifying other studies with similar expression of 101 gene signature in the context of the public corpus of gene expression studies using NextBio. The top 20 experiments with gene signatures present in the NextBio database that have the highest enrichment scores for the 101 gene signature are listed below. Multiple murine asthma studies demonstrate similar gene expression patterns to the 101 gene signature.

| Study Name                                                                 | GEO ID        |
|---------------------------------------------------------------------------|---------------|
| Lung gene expression profiles in a mouse model of IL-13-induced allergic airway inflammation | GSE35979      |
| Lungs of BALB/c wildtype or Rag deficient mice exposed to ovalbumin as an experimental asthma model | GSE6858      |
| Murine pulmonary responses to ambient Baltimore particulate matter          | GSE9465      |
| Lungs from IFNγ-/-, IRF1-/-, or WT mice infected with M. avium              | GSE11809     |
| Effect of a disease-associated human IL-4 receptor allele in experimental asthma | GSE18010     |
| Hookworm-Induced Persistent Changes to the Immunological Environment of the Lung | GSE5555      |
| Virus-Induced Airway Disease in Mice                                       | GSE10964     |
| The effect of IL-13 and dust mites on gene expression in murine model of asthma | GSE1301     |
| Lungs of BAL/C mice sensitized with ovalbumin (OVA) and exposed to diesel exhaust particles (DEP) | GSE22357     |
| Lungs of C57BL6 mice infected with a low dose of M. tuberculosis for 30 and 70 days | E-MEXP-1899 |
| Lungs from mice in time course infection study of pandemic H1N1 influenza A isolate A/CA/4/2009 | GSE37569     |
| Murine Airway Hyperresponsiveness                                          | GSE3184      |
| Hyperlipidemic aorta atherosclerosis in ApoE null mice                     | GSE21419     |
| Immune response to Pneumocystis Infection in WT and CD40 Ligand Deficient Mice | GSE11005    |
| Lung expression in Foxa3 knock-out and wildtype mice challenged with allergen | GSE13382     |
| Plasma cell tumor progression                                              | GSE34078     |
| Lungs from mice exposed to bleomycin                                       | GSE16846     |
| Ovalbumen sensitized and challenged A/J mice                               | GSE450       |
| Lung gene expression in ovalbumin (OVA)-induced experimental asthma        | GSE11911     |
| Mndal suppresses cell growth and may modify plasmacytoma susceptibility    | GSE17297     |
Table 4. Description of exposure protocol used in comparing endotoxin, cigarette smoke, and endotoxin plus cigarette smoke exposed mice.

| Investigator | Endotoxin strain | Mouse strain | Exposure protocol | Microarray platform |
|--------------|------------------|--------------|-------------------|---------------------|
| Meng et al   | *Escherichia coli* serotype O55:B5 | AKR/J        | **Air only (Control)** | Affymetrix mouse genome 430 2.0 array |
|              |                   |              | • HEPA-filtered air |                     |
|              |                   |              | • 3 weeks          |                     |
|              |                   |              | • N=6              |                     |
|              |                   |              | **LPS only**       |                     |
|              |                   |              | • 0.5 μg LPS/L nebulized LPS |       |
|              |                   |              | • 1 h/day, 2x/week |                     |
|              |                   |              | • 3 weeks          |                     |
|              |                   |              | • N=5              |                     |
|              |                   |              | **Smoke only**    |                     |
|              |                   |              | • 2R4F cigarettes (250 μg WTPM) |       |
|              |                   |              | • 5 h/day, 5x/week |                     |
|              |                   |              | • 3 weeks          |                     |
|              |                   |              | • N=6              |                     |
|              |                   |              | **LPS + smoke**   |                     |
|              |                   |              | • Smoke protocol (5x/week) with concurrent LPS protocol (2x/week) |       |
|              |                   |              | • 3 weeks          |                     |
|              |                   |              | • N=5              |                     |
Figure legends

Figure 1. Comparison of 3 identified studies of murine inhaled endotoxin exposure used to generate gene signature. 1a. Common intersect of differentially regulated genes (endotoxin vs. control exposure) identifies a gene signature for endotoxin exposure. 1b. Common intersect of arrays used in each studies represents a background distribution to identify the statistical significance of the gene signature. 1c. 2-way hypergeometric tests to identify statistical significance of gene signature.

Figure 2. Comparison of all 4 identified studies at the pathway level. Pathway enrichment calculated using hypergeometric tests with all known pathways present in Netpath, Wikipathways, Kegg, and Reactome, with Cytoscape for visualization. 2a. Lai et al, 5 day exposure. 2b. Lai et al, 8 week exposure. 2c. Meng et al, 3 week exposure. 2d. Brass et al, 1 week exposure.

Figure 3. Consensus clustering of air, endotoxin, smoke, and endotoxin plus smoke exposed mice using endotoxin gene signature and random gene signature. The endotoxin gene signature accurately clusters the different exposure groups 99.97% of the time as compared to a randomly chosen gene signature which accurately clusters the different exposure groups 78.15% of the time.
Figure 1.

A

Lai et al (5 day)

Brass et al (1 week)

Meng et al (3 week)

101

187

43

1035

142

280

1266

B

Affymetrix 430a 2.0

Agilent custom array

11194

0

0

3777

3442

2974

4743

Affymetrix 430 2.0

C

Studies compared

Probability of selecting common genes

Brass et al

Brass et al

Meng et al

Lai et al

Brass et al

Meng et al

Lai et al

Brass et al

Lai et al

Meng et al

0.1076

0.381

0.1408

0.1076

0.381

0.1408

p < 4.1 e-27

p < 1.8 e-24

p < 4.4 e-75
Figure 2.
Figure 3.

Endotoxin gene signature  Random gene signature
Supplementary figures and tables

**Supplementary Figure 1.** Overview of methods.

**Pubmed Search**
(MeSH Terms)
- Gene Expression Profiling
- Lipopolysaccharides
- Lung

3 publications identified (4 experimental models)

Gene expression data obtained from authors

**Data Processing**
- Probeset re-annotation to HUGO gene symbols
- Within-study normalization
- Differential gene expression analysis

3 gene lists (differentially expressed genes at 5% FDR)

1. **Identify gene signature**
Common intersect of differentially regulated genes from 3 experimental models

2. **Statistical significance**
Intersect of gene list (signature)
Intersect of array platforms (background distribution)
Hypergeometric test

3. **Validation**
4th experimental model

4. **Biological significance**
Gene level annotation
Functional level enrichment (Gene Ontology)
Comparison with publicly available data (NextBio)
Comparison of LPS, smoke, smoke + LPS study (classification using consensus clustering)
Supplementary Figure 2. Heatmap based on normalized expression intensity of 101 genes in gene signature between endotoxin and control phosphate buffered saline exposed mice. Normalized expression intensities been centered to a mean expression of zero across each gene. 2a. Gene signature accurately classifies between endotoxin (LPS) and control (PBS) exposed mice at 8 weeks. 2b. Expression patterns for the 101 genes at 5 days are concordant with those observed at 8 weeks.
Supplementary Figure 3. Heatmap based on log₂ fold change of 101 genes in gene signature in smoke, endotoxin, and smoke plus endotoxin exposed mice as compared to air exposed (control) mice. Gene signature accurately classifies between these groups.
**Supplementary Table 1.** Annotation of 101 gene signature with gene name and MGI identifier.

| MGI symbol | MGI Description | MGI ID |
|------------|-----------------|--------|
| 1100001G20Rik | RIKEN cDNA 1100001G20 gene Gene | MGI:1913357 |
| Acp2 | acid phosphatase 2, lysosomal Gene | MGI:87882 |
| Atp6ap2 | ATPase, H+ transporting, lysosomal accessory protein 2 Gene | MGI:1917745 |
| B4galnt1 | beta-1,4-N-acetyl-galactosaminyl transferase 1 Gene | MGI:1342057 |
| Bcl2a1a | B-cell leukemia/lymphoma 2 related protein A1a Gene | MGI:102687 |
| Bcl2a1b | B-cell leukemia/lymphoma 2 related protein A1b Gene | MGI:1278326 |
| Bcl2a1d | B-cell leukemia/lymphoma 2 related protein A1d Gene | MGI:1278325 |
| Bst1 | bone marrow stromal cell antigen 1 Gene | MGI:105370 |
| C1qb | complement component 1, q subcomponent, beta polypeptide Gene | MGI:88224 |
| C1ra | complement component 1, r subcomponent A Gene | MGI:1355313 |
| C1rb | complement component 1, r subcomponent B Gene | MGI:3779804 |
| C2 | complement component 2 (within H-2S) Gene | MGI:88226 |
| C3 | complement component 3 Gene | MGI:88227 |
| Capg | capping protein (actin filament), gelsolin-like Gene | MGI:1098259 |
| Ccl6 | chemokine (C-C motif) ligand 6 Gene | MGI:98263 |
| Ccl9 | chemokine (C-C motif) ligand 9 Gene | MGI:104533 |
| Cd14 | CD14 antigen Gene | MGI:88318 |
| Cd1d1 | CD1d1 antigen Gene | MGI:107674 |
| Cd200r1 | CD200 receptor 1 Gene | MGI:1889024 |
| Cd68 | CD68 antigen Gene | MGI:88342 |
| Cfb | complement factor B Gene | MGI:105975 |
| Ch25h | cholesterol 25-hydroxylase Gene | MGI:1333369 |
| Chi3l1 | chitinase 3-like 1 Gene | MGI:1340899 |
| Chi3l3 | chitinase 3-like 3 Gene | MGI:1330860 |
| Clec4a2 | C-type lectin domain family 4, member a2 Gene | MGI:1349412 |
| Clec4n | C-type lectin domain family 4, member n Gene | MGI:1861231 |
| Clec7a | C-type lectin domain family 7, member a Gene | MGI:1861431 |
| Clu | clusterin Gene | MGI:88423 |
| Cp | ceruloplasmin Gene | MGI:88476 |
| Csf2rb2 | colony stimulating factor 2 receptor, beta 2, low-affinity (granulocyte-macrophage) Gene | MGI:1339760 |
| Ctsb | cathepsin B Gene | MGI:88561 |
| Ctsk | cathepsin K Gene | MGI:107823 |
| Cts | cathepsin S Gene | MGI:107341 |
| Ctsz | cathepsin Z Gene | MGI:1891190 |
| Cxcl17 | chemokine (C-X-C motif) ligand 17 Gene | MGI:2387642 |
| Cxcl2 | chemokine (C-X-C motif) ligand 2 Gene | MGI:1340094 |
| Cyba | cytochrome b-245, alpha polypeptide Gene | MGI:1316658 |
| Gene    | Description                                                                 | MGI   |
|---------|------------------------------------------------------------------------------|-------|
| Cybb    | cytochrome b-245, beta polypeptide Gene                                       | 88574 |
| Dab2    | disabled homolog 2 (Drosophila) Gene                                          | 109175|
| Dbp     | D site albumin promoter binding protein Gene                                  | 94866 |
| Emr1    | EGF-like module containing, mucin-like, hormone receptor-like sequence 1 Gene| 106912|
| F10     | coagulation factor X Gene                                                    | 103107|
| Fn1     | fibronectin 1 Gene                                                           | 95566 |
| Fpr2    | formyl peptide receptor 2 Gene                                               | 1278319|
| Gatm    | glycine amidinotransferase (L-arginine:glycine amidinotransferase) Gene       | 1914342|
| Grn     | granulin Gene                                                                | 95832 |
| H2-Ab1  | histocompatibility 2, class II antigen A, beta 1 Gene                         | 103070|
| Havcr2  | hepatitis A virus cellular receptor 2 Gene                                    | 2159682|
| Hvnc1   | hydrogen voltage-gated channel 1 Gene                                         | 1921346|
| Id2     | inhibitor of DNA binding 2 Gene                                              | 96397 |
| Ifi30    | interferon gamma inducible protein 30 Gene                                    | 2137648|
| Ifit3    | interferon-induced protein with tetratricopeptide repeats 3 Gene             | 1101055|
| Igf1    | insulin-like growth factor 1 Gene                                            | 96432 |
| Ifi33    | interleukin 33 Gene                                                          | 1924375|
| Itgax   | integrin alpha X Gene                                                        | 96609 |
| Itgb2   | integrin beta 2 Gene                                                         | 96611 |
| Itih4   | inter alpha-trypsin inhibitor, heavy chain 4 Gene                            | 109536|
| Lair1   | leukocyte-associated Ig-like receptor 1 Gene                                  | 105492|
| Laptm5  | lysosomal-associated protein transmembrane 5 Gene                            | 108046|
| Lbp     | lipopolysaccharide binding protein Gene                                       | 1098776|
| Lgals3bp| lectin, galactoside-binding, soluble, 3 binding protein Gene                 | 99554 |
| Lrg1    | leucine-rich alpha-2-glycoprotein 1 Gene                                     | 1924155|
| Matn4   | matrilin 4 Gene                                                              | 1328314|
| Mmp12   | matrix metalloproteinase 12 Gene                                             | 97005 |
| Ms4a6d  | membrane-spanning 4-domains, subfamily A, member 6D Gene                     | 1916024|
| Ms4a7   | membrane-spanning 4-domains, subfamily A, member 7 Gene                      | 1918846|
| Mtm1    | X-linked myotubular myopathy gene 1 Gene                                      | 1099452|
| Muc1    | mucin 1, transmembrane Gene                                                  | 97231 |
| Naip1-rs1| NLR family, apoptosis inhibitory protein 1, related sequence 1 Pseudogene    | 109439|
| Naip2   | NLR family, apoptosis inhibitory protein 2 Gene                              | 1298226|
| Olfm1   | olfactomedin 1 Gene                                                          | 1860437|
| Ohr1    | oxidized low density lipoprotein (lectin-like) receptor 1 Gene               | 1261434|
| Orm1    | orosomucoid 1 Gene                                                           | 97443 |
| Orm2    | orosomucoid 2 Gene                                                           | 97444 |
| Per3    | period homolog 3 (Drosophila) Gene                                           | 1277134|
Supplementary Table 2. Pubmed search of genes present in gene signature previously reported to be associated with asthma.

| symbol   | count | pmid   | year  | journal                                         |
|----------|-------|--------|-------|------------------------------------------------|
| Tgfbi    | 0     | 0      |       |                                                 |
| Matn4    | 0     | 0      |       |                                                 |
| Clec7a   | 0     | 0      |       |                                                 |
| Oir1     | 1     | 22611474 | 2012 | American journal of translational research     |
| Ctsz     | 0     | 0      |       |                                                 |
| Mmp12    | 12    | 23075521 | 2012 | International archives of allergy and immunology |
| Mmp12    | 12    | 22837640 | 2012 | Biomarker insights                             |
| Mmp12    | 12    | 22305682 | 2012 | The Journal of allergy and clinical immunology |
| Mmp12    | 12    | 22216879 | 2012 | Clinical and molecular allergy : CMA           |
| Mmp12    | 12    | 20546881 | 2010 | The Journal of allergy and clinical immunology |
| Mmp12    | 12    | 20133923 | 2010 | American journal of respiratory and critical care medicine |
| Mmp12    | 12    | 20018959 | 2009 | The New England journal of medicine            |
| Gene | Year | Publication Title | Volume | Unique identifier |
|------|------|------------------|--------|------------------|
| Mmp12 | 2009 | American journal of physiology. Lung cellular and molecular physiology | 12 | 19028979 |
| Mmp12 | 2005 | Respiratory research | 12 | 16359550 |
| Mmp12 | 2005 | American journal of respiratory and critical care medicine | 12 | 16166618 |
| Mmp12 | 2004 | Biochemical and biophysical research communications | 12 | 15474460 |
| Mmp12 | 2002 | Chest | 12 | 11893658 |
| Per3 | 0 | 0 | 0 | 0 |
| Dab2 | 0 | 0 | 0 | 0 |
| Slc3a2 | 0 | 0 | 0 | 0 |
| Cyba | 6 | 2009 | Terapevticheskij arkhiv | 19459419 |
| Cyba | 6 | 2009 | International archives of allergy and immunology | 18716406 |
| Cyba | 6 | 2008 | Genetika | 18672803 |
| Cyba | 6 | 2006 | Journal of negative results in biomedicine | 16608528 |
| Cyba | 6 | 2003 | Journal of immunology (Baltimore, Md. : 1950) | 12594296 |
| Cyba | 6 | 2002 | The Journal of biological chemistry | 11940577 |
| Fpr2 | 9 | 2012 | Biochemical pharmacology | 22410002 |
| Fpr2 | 9 | 2012 | Journal of human genetics | 22377711 |
| Fpr2 | 9 | 2012 | Archives of pharmacal research | 22297737 |
| Fpr2 | 9 | 2011 | Biochemical pharmacology | 21095183 |
| Fpr2 | 9 | 2008 | American journal of respiratory and critical care medicine | 18583575 |
| Fpr2 | 9 | 2006 | FEBS letters | 17046755 |
| Fpr2 | 9 | 2002 | Nature medicine | 12205450 |
| Fpr2 | 9 | 2002 | Nature medicine | 12172542 |
| Fpr2 | 9 | 2002 | Cellular and molecular life sciences : CMLS | 12088274 |
| Ctsk | 1 | 2007 | Current pharmaceutical design | 17311556 |
| Ctss | 1 | 2012 | The Journal of investigative dermatology | 22170489 |
| Dbp | 12 | 2012 | Water research | 23026126 |
| Dbp | 12 | 2012 | European journal of clinical nutrition | 22234043 |
| Dbp | 12 | 2011 | Environmental research | 21429484 |
| Dbp | 12 | 2011 | Journal of agricultural and food chemistry | 21370925 |
| Dbp | 12 | 2009 | Immunology | 19740346 |
| Dbp | 12 | 2009 | Revista portuguesa de pneumologia | 18528597 |
| Dbp | 12 | 2007 | Environmental science & technology | 17969688 |
| Dbp | 12 | 2005 | Water research | 16236340 |
| Dbp | 12 | 2004 | Journal of human hypertension | 15103311 |
| Dbp | 12 | 1996 | Indian journal of physiology and pharmacology | 9055100 |
| Dbp | 12 | 1992 | Journal of cardiovascular pharmacology | 1279289 |
| Dbp | 12 | 1984 | Angiology | 6507943 |
| Ctsb | 0 | 0 | 0 | 0 |
| Laptm5 | 0 | 0 | 0 | 0 |
| Cxcl2 | 30 | 2012 | PloS one | 22355409 |
| Cxcl2 | 30 | 2011 | Journal of environmental science and health | 21961642 |
| Gene | Value | Year | Journal Title/Sources |
|------|-------|------|-----------------------|
| Cxcl2 | 30 | 21356202 | 2011 | Chemico-biological interactions |
| Cxcl2 | 30 | 19864593 | 2009 | Journal of immunology (Baltimore, Md.: 1950) |
| Cxcl2 | 30 | 19785013 | 2009 | Stem cells (Dayton, Ohio) |
| Cxcl2 | 30 | 19744573 | 2009 | Pulmonary pharmacology & therapeutics |
| Cxcl2 | 30 | 19671179 | 2009 | Virology journal |
| Cxcl2 | 30 | 19560456 | 2009 | European journal of pharmacology |
| Cxcl2 | 30 | 19050257 | 2008 | Journal of immunology (Baltimore, Md.: 1950) |
| Cxcl2 | 30 | 19787777 | 2008 | Inflammation research |
| Cxcl2 | 30 | 18774390 | 2008 | The Journal of allergy and clinical immunology |
| Cxcl2 | 30 | 18292580 | 2008 | Journal of immunology (Baltimore, Md.: 1950) |
| Cxcl2 | 30 | 18021431 | 2007 | Respiratory research |
| Cxcl2 | 30 | 18007984 | 2007 | Environmental health perspectives |
| Cxcl2 | 30 | 17980417 | 2008 | The Journal of allergy and clinical immunology |
| Cxcl2 | 30 | 17641782 | 2007 | The Journal of clinical investigation |
| Cxcl2 | 30 | 17014439 | 2006 | Clinical and experimental allergy |
| Cxcl2 | 30 | 16929007 | 2006 | Toxicological sciences : an official journal of the Society of Toxicology |
| Cxcl2 | 30 | 16290175 | 2005 | Cytokine |
| Cxcl2 | 30 | 16202497 | 2006 | Toxicology |
| Cxcl2 | 30 | 16122864 | 2005 | Toxicology |
| Cxcl2 | 30 | 15885264 | 2005 | Toxicology and applied pharmacology |
| Cxcl2 | 30 | 1558884 | 2004 | Journal of immunology (Baltimore, Md.: 1950) |
| Cxcl2 | 30 | 14976461 | 2004 | Medical science monitor |
| Cxcl2 | 30 | 12476359 | 2003 | Inhalation toxicology |
| Cxcl2 | 30 | 11766995 | 2001 | Inflammation research |
| Cxcl2 | 30 | 11726396 | 2001 | American journal of respiratory cell and molecular biology |
| Cxcl2 | 30 | 9847020 | 1998 | Veterinary immunology and immunopathology |
| Cxcl2 | 30 | 9490662 | 1998 | American journal of respiratory cell and molecular biology |
| Saa3 | 3 | 22174454 | 2012 | Journal of immunology (Baltimore, Md.: 1950) |
| Saa3 | 3 | 21622869 | 2011 | Journal of immunology (Baltimore, Md.: 1950) |
| Saa3 | 3 | 16973978 | 2006 | American journal of respiratory and critical care medicine |
| Tmem106a | 0 | NA | NA | Boletín de la Asociación Médica de Puerto Rico |
| Prkcd | 5 | 15536414 | 2004 | The Journal of allergy and clinical immunology |
| Prkcd | 5 | 12759450 | 2003 | Journal of immunology (Baltimore, Md.: 1950) |
| Prkcd | 5 | 12529321 | 2003 | The Journal of biological chemistry |
| Prkcd | 5 | 11748588 | 2001 | Journal of cellular physiology |
| Prkcd | 5 | 9478929 | 1998 | The Journal of biological chemistry |
| Clu | 1 | 10842440 | 2008 | NA | Boletín de la Asociación Médica de Puerto Rico |
| Smpdl3b | 0 | NA | NA | Boletín de la Asociación Médica de Puerto Rico |
| Lair1 | 0 | NA | NA | Boletín de la Asociación Médica de Puerto Rico |
| Ithh4 | 0 | NA | NA | Boletín de la Asociación Médica de Puerto Rico |
| Journal Title                                      | Volume | Year | DOI       | Title                                                                 |
|---------------------------------------------------|--------|------|-----------|----------------------------------------------------------------------|
| Journal of Immunology (Baltimore, Md. : 1950)     | 0      | 0    | 20083656  | 2010                                                                  |
| The Journal of Experimental Medicine             | 2      | 1999 | 9927517   | 1999                                                                  |
| Iranian Journal of Public Health                | 143    | 2012 | 23113211  | 2012                                                                  |
| Bioorganicheskaii khimii                        | NA     | NA   | 22997700  | 2009                                                                  |
| Zhongguo zhen jiu = Chinese acupuncture & moxibustion | 143    | 2012 | 22734375  | 2012                                                                  |
| PLoS One                                         | 143    | 2012 | 22567103  | 2012                                                                  |
| Clinical Laboratory                              | 143    | 2012 | 22372350  | 2012                                                                  |
| Medical Science Monitor                          | 143    | 2012 | 22367138  | 2012                                                                  |
| Allergology International                        | 143    | 2012 | 22361510  | 2012                                                                  |
| American Journal of Respiratory and Critical Care Medicine | 143    | 2012 | 22246175  | 2012                                                                  |
| Clinical and Experimental Allergy                | 143    | 2012 | 22211906  | 2012                                                                  |
| Journal of Aerosol Medicine and Pulmonary Drug Delivery | 143    | 2012 | 22149063  | 2012                                                                  |
| Jornal de pediatria                              | NA     | NA   | 22065014  | 2009                                                                  |
| Disease Markers                                  | 143    | 2011 | 21846943  | 2011                                                                  |
| Clinical and Experimental Allergy                | 143    | 2011 | 21801245  | 2011                                                                  |
| Biochemical Pharmacology                         | 143    | 2011 | 21620804  | 2011                                                                  |
| Journal of Alternative and Complementary Medicine (New York, N.Y.) | 143    | 2011 | 21480785  | 2011                                                                  |
| Chinese Journal of Medical Genetics              | 143    | 2011 | 21462136  | 2011                                                                  |
| Journal of Human Genetics                         | 143    | 2004 | 21210563  | 2004                                                                  |
| Phytomedicine                                    | 143    | 2010 | 20696559  | 2010                                                                  |
| Food and Chemical Toxicology                     | 143    | 2010 | 20600518  | 2010                                                                  |
| Indian Journal of Pediatrics                     | 143    | 2010 | 20589464  | 2010                                                                  |
| Journal of the Neurological Sciences             | 143    | 2010 | 20538303  | 2010                                                                  |
| American Journal of Physiology, Lung Cellular and Molecular Physiology | 143    | 2010 | 20511342  | 2010                                                                  |
| Expert Review of Clinical Immunology              | 143    | 2010 | 20402389  | 2010                                                                  |
| Journal of Human Genetics                         | 143    | 2010 | 20395963  | 2010                                                                  |
| Proteomics                                        | 143    | 2010 | 20029843  | 2010                                                                  |
| Journal of Immunology (Baltimore, Md. : 1950)    | 143    | 2009 | 19684087  | 2009                                                                  |
| Ancient Science of Life                          | 143    | 2009 | 22557323  | 2009                                                                  |
| Journal of Human Genetics                         | 143    | 2008 | 18566738  | 2008                                                                  |
| Journal of Immunology (Baltimore, Md. : 1950)    | 143    | 2008 | 18424754  | 2008                                                                  |
| Indian Journal of Orthopaedics                   | 143    | 2008 | 19823661  | 2008                                                                  |
| Neurophysiologie clinique = Clinical neurophysiology | 143    | 2008 | NA        | 2008                                                                  |
| Journal of Immunology (Baltimore, Md. : 1950)    | 143    | 2006 | 17082579  | 2006                                                                  |
| Translational Research : the Journal of Laboratory and Clinical Medicine | 143    | 2006 | 17002917  | 2006                                                                  |
| The Japanese Journal of Clinical Pathology        | 143    | 2006 | 16913666  | 2006                                                                  |
| Clinical and Experimental Immunology              | 143    | 2006 | 16879240  | 2006                                                                  |
| American Journal of Respiratory Cell and Molecular Biology | 143    | 2006 | 16858009  | 2006                                                                  |
| C3 | 143 | 16574942 | 2006 | American journal of respiratory cell and molecular biology |
| C3 | 143 | 16439722 | 2006 | American journal of respiratory and critical care medicine |
| C3 | 143 | 16355111 | 2006 | Genes and immunity |
| C3 | 143 | 16312927 | 2005 | Zhongguo zhen jiu = Chinese acupuncture & moxibustion |
| C3 | 143 | 16293803 | 2006 | American journal of respiratory and critical care medicine |
| C3 | 143 | 16186675 | 2005 | Indian journal of pediatrics |
| C3 | 143 | 16113417 | 2004 | Proceedings of the American Thoracic Society |
| C3 | 143 | 15655111 | 2006 | Genes and immunity |
| C3 | 143 | 15278436 | 2004 | Human genetics |
| C3 | 143 | 12097289 | 2002 | Cancer research |
| C3 | 143 | 12096683 | 2002 | Central European journal of public health |
| C3 | 143 | 11980156 | 2002 | Klinicheskaia meditsina |
| C3 | 143 | 11979168 | 2002 | Spine |
| C3 | 143 | 11591733 | 2001 | Journal of immunology (Baltimore, Md. : 1950) |
| C3 | 143 | 11510804 | 2001 | The European respiratory journal |
| C3 | 143 | 11477893 | 1998 | Chinese journal of tuberculosis and respiratory diseases |
| C3 | 143 | 11189891 | 2000 | Handchirurgie, Mikrochirurgie, plastische Chirurgie |
| C3 | 143 | 10826222 | 2000 | Hukuoka acta medica |
| C3 | 143 | 10660972 | NA | Romanian journal of internal medicine |
| C3 | 143 | 10553582 | 1999 | Nihon yakurigaku zasshi. Folia pharmacologica Japonica |
| C3 | 143 | 10594541 | 1999 | Clinical and experimental allergy |
| C3 | 143 | 9538632 | 1998 | The Korean journal of internal medicine |
| C3 | 143 | 9440942 | 1997 | Meditsina truda i promyshlennaia ekologiya |
| C3 | 143 | 8843003 | 1996 | Journal of Korean medical science |
| C3 | 143 | 8563490 | 1996 | International archives of allergy and immunology |
| C3 | 143 | 8520733 | 1995 | American journal of respiratory and critical care medicine |
| C3 | 143 | 7752082 | 1995 | The Journal of pharmacology and experimental therapeutics |
| C3 | 143 | 7950448 | NA | Pneumoftiziologia |
| C3 | 143 | 8443468 | 1993 | International archives of allergy and immunology |
| C3 | 143 | 8428161 | 1993 | International archives of allergy and immunology |
| C3 | 143 | 1558328 | 1992 | Annals of allergy |
| C3 | 143 | 1548406 | 1992 | Journal of immunological methods |
| C3 | 143 | 1476040 | 1992 | Acta dermato-venereologica. Supplementum |
| C3 | 143 | 1345603 | 1992 | Bulletin of the Institute of Maritime and Tropical Medicine in Gdynia |
| C3 | 143 | 1659436 | 1991 | British journal of clinical pharmacology |
| C3 | 143 | 1772350 | 1991 | ArerugÄ« = [Allergy] |
| C3 | 143 | 1953911 | 1991 | The European respiratory journal. Supplement |
| C3 | 143 | 1773456 | 1991 | Chinese journal of modern developments in traditional medicine |
| C3 | 143 | 1669567 | 1991 | Journal of investigational allergology & clinical immunology |
| C3 | 143 | 1809688 | 1991 | International archives of allergy and applied immunology |
| C3 | 143 | 2221489 | 1990 | Annals of allergy |
| C3 | 143 | 2129476 | NA | Archivos de investigaciÃ³n mÃ©dica |
| C3 | 143 | 2802267 | 1989 | Annals of allergy |
| C3 | 143 | 2721280 | 1989 | Chest |
| C3 | 143 | 2526632 | 1989 | Asian Pacific journal of allergy and immunology |
| C3 | 143 | 3272988 | NA | Zhonghua Minguo xiao er ke yi xue hui za zhi [Journal] |
| C3 | 143 | 3258826 | 1988 | The European respiratory journal |
| C3 | 143 | 3545262 | 1987 | Archives of otolaryngology--head & neck surgery |
| C3 | 143 | 3506436 | 1987 | Bulletin of the Institute of Maritime and Tropical Medicine in Gdynia |
| C3 | 143 | 3491553 | 1986 | Annals of allergy |
| C3 | 143 | 3717764 | 1986 | The American review of respiratory disease |
| C3 | 143 | 2951829 | 1986 | Respiration; international review of thoracic diseases |
| C3 | 143 | 4050221 | 1985 | Zhurnal mikrobiologii, epidemiologii, i immunobiologii |
| C3 | 143 | 4033033 | 1985 | Klinicheskaia meditsina |
| C3 | 143 | 3893231 | 1985 | Annals of allergy |
| C3 | 143 | 4029967 | 1985 | Human heredity |
| C3 | 143 | 6442583 | 1984 | Asian Pacific journal of allergy and immunology |
| C3 | 143 | 6210004 | 1984 | The American review of respiratory disease |
| C3 | 143 | 6528951 | NA | AlergÃ­a |
| C3 | 143 | 6085153 | 1984 | Pneumonologia polska |
| C3 | 143 | 6499053 | 1984 | CeskoslovenskÃ¡ pediatrie |
| C3 | 143 | 6465480 | 1984 | Allergy |
| C3 | 143 | 6429229 | 1984 | The Journal of allergy and clinical immunology |
| C3 | 143 | 6201833 | 1984 | Pneumonologia polska |
| C3 | 143 | 6719352 | 1984 | Terapevticheskii arkhiv |
| C3 | 143 | 6627619 | 1983 | Clinical allergy |
| C3 | 143 | 6544421 | NA | La Pediatria medica e chirurgica |
| C3 | 143 | 6342165 | 1983 | South African medical journal |
| C3 | 143 | 6878777 | 1983 | Revista clÃ­nica espaÃ±ola |
| C3 | 143 | 6194517 | 1983 | Pneumonologia polska |
| C3 | 143 | 6831684 | 1983 | Clinical allergy |
| C3 | 143 | 6924864 | 1982 | Clinical allergy |
| C3 | 143 | 6919393 | NA | Allergologia et immunopathologia |
| C3 | 143 | 6797794 | 1982 | Chest |
| C3 | 143 | 6975678 | 1981 | Clinical and experimental immunology |
| C3 | 143 | 6781385 | 1981 | Annals of allergy |
| C3 | 143 | 6975491 | 1981 | Respiration; international review of thoracic diseases |
| C3 | 143 | 7444701 | 1980 | South African medical journal |
| C3 | 143 | 6768786 | 1980 | The Journal of allergy and clinical immunology |
| C3  | 143 | 539520  | NA | Allergologia et immunopathologia |
|-----|-----|---------|----|---------------------------------|
| C3  | 143 | 382104  | 1979 | La Nouvelle presse médicale |
| C3  | 143 | 156917  | 1979 | Praxis und Klinik der Pneumologie |
| C3  | 143 | 445782  | 1979 | Clinical allergy |
| C3  | 143 | 115071  | NA | Revue française des maladies respiratoires |
| C3  | 143 | 162027  | 1979 | Allergie und Immunologie |
| C3  | 143 | 752256  | NA | Allergologia et immunopathologia |
| C3  | 143 | 373930  | 1978 | Clinical and experimental immunology |
| C3  | 143 | 709794  | 1978 | Clinical allergy |
| C3  | 143 | 686507  | 1978 | Annals of allergy |
| C3  | 143 | 679797  | 1978 | Archives of internal medicine |
| C3  | 143 | 308809  | 1978 | British journal of diseases of the chest |
| C3  | 143 | 309715  | NA | Allergologia et immunopathologia |
| C3  | 143 | 652026  | 1978 | Mycopathologia |
| C3  | 143 | 627043  | 1978 | Clinical allergy |
| C3  | 143 | 846785  | 1977 | Pediatric research |
| C3  | 143 | 324512  | 1977 | The British journal of dermatology |
| C3  | 143 | 67566   | 1977 | Nature |
| C3  | 143 | 872357  | 1977 | Clinical allergy |
| C3  | 143 | 988767  | 1976 | The American review of respiratory disease |
| C3  | 143 | 968799  | 1976 | Thorax |
| C3  | 143 | 56632   | 1976 | Lancet |
| C3  | 143 | 58741   | 1976 | Clinical allergy |
| C3  | 143 | 109944  | 1975 | Annals of allergy |
| C3  | 143 | 1100092 | 1975 | The British journal of dermatology |
| LOC100048759 | 0 | 0 | | |
| Fn1 | 1   | 19710636 | 2010 | Mucosal immunology |
| Emr1 | 1   | 20625511 | 2010 | PloS one |
| Chi3I3 | 7   | 22014099 | 2011 | BMC immunology |
| Chi3I3 | 7   | 21530272 | 2011 | Bioorganic & medicinal chemistry |
| Chi3I3 | 7   | 21469115 | 2011 | European journal of immunology |
| Chi3I3 | 7   | 18758056 | 2008 | Biological & pharmaceutical bulletin |
| Chi3I3 | 7   | 18087596 | 2007 | Environmental health perspectives |
| Chi3I3 | 7   | 17082650 | 2006 | Journal of immunology (Baltimore, Md. : 1950) |
| Chi3I3 | 7   | 11553632 | 2001 | The Journal of biological chemistry |
| Acp2 | 0   | 0 | | |
| H2-Ab1 | 0   | 0 | | |
| Havcr2 | 18  | 21623966 | 2011 | Clinical and experimental allergy |
| Havcr2 | 18  | 21575348 | 2011 | Chinese journal of contemporary pediatrics |
| Havcr2 | 18  | 21470319 | 2011 | Clinical and experimental allergy |
| Havcr2 | 18  | 20536563 | 2010 | Immunological reviews |
| Havcr2 | 18 | 20083673 | 2010 | Journal of immunology (Baltimore, Md.: 1950) |
|--------|----|----------|------|---------------------------------------------|
| Havcr2 | 18 | 19905911 | 2009 | The Journal of asthma                        |
| Havcr2 | 18 | 19566956 | 2009 | BMC medical genetics                         |
| Havcr2 | 18 | 19494522 | 2009 | International archives of allergy and immunology |
| Havcr2 | 18 | 18785518 | 2008 | Chinese journal of tuberculosis and respiratory diseases |
| Havcr2 | 18 | 18727494 | 2008 | Current topics in microbiology and immunology |
| Havcr2 | 18 | 16456792 | 2006 | Chinese journal of medical genetics           |
| Havcr2 | 18 | 16002337 | 2005 | Trends in molecular medicine                 |
| Havcr2 | 18 | 15867855 | 2005 | The Journal of allergy and clinical immunology |
| Havcr2 | 18 | 15603868 | 2004 | Human immunology                             |
| Havcr2 | 18 | 15272240 | 2004 | Experimental & molecular medicine            |
| Havcr2 | 18 | 14999428 | 2004 | Springer seminars in immunopathology         |
| Havcr2 | 18 | 14508299 | 2003 | Current opinion in pediatrics                |
| Havcr2 | 18 | 11725301 | 2001 | Nature immunology                            |
| Cfb    | 0  | 0        |      |                                              |
| C2     | 43 | 22826050 | 2013 | Advances in experimental medicine and biology |
| C2     | 43 | 22458856 | 2012 | Journal of environmental science and health   |
| C2     | 43 | 22142423 | 2012 | Journal of medicinal chemistry               |
| C2     | 43 | 22094623 | 2012 | Respiration; international review of thoracic diseases |
| C2     | 43 | 21889615 | 2011 | Journal of biomedical informatics           |
| C2     | 43 | 20600518 | 2010 | Food and chemical toxicology                |
| C2     | 43 | 20368027 | 2010 | Chinese journal of tuberculosis and respiratory diseases |
| C2     | 43 | 19651244 | 2009 | Respiratory physiology & neurobiology       |
| C2     | 43 | 18842290 | 2008 | The Journal of allergy and clinical immunology |
| C2     | 43 | 17379851 | 2007 | American journal of respiratory and critical care medicine |
| C2     | 43 | 17305324 | 2007 | Journal of medicinal chemistry               |
| C2     | 43 | 16843616 | 2006 | Medical hypotheses                           |
| C2     | 43 | 16840383 | 2006 | Chest                                       |
| C2     | 43 | 16061704 | 2005 | Thorax                                      |
| C2     | 43 | 15853649 | 2005 | Current protein & peptide science            |
| C2     | 43 | 15805998 | 2005 | The Journal of allergy and clinical immunology |
| C2     | 43 | 15135092 | 2004 | Journal of chromatography.                  |
| C2     | 43 | 14642800 | 2003 | Clinical therapeutics                       |
| C2     | 43 | 12872723 | 2003 | Nihon Jibiinkoka Gakkai kaiho               |
| C2     | 43 | 12693800 | 2003 | Respiratory medicine                        |
| C2     | 43 | 12495964 | 2003 | Archives of disease in childhood            |
| C2     | 43 | 12184862 | 2002 | Journal of aerosol medicine                 |
| C2     | 43 | 12153960 | 2002 | American journal of respiratory and critical care medicine |
| C2     | 43 | 11979168 | 2002 | Spine                                       |
| C2     | 43 | 11964752 | 2002 | Current opinion in allergy and clinical immunology |
| C2     | 43 | 11477893 | 1998 | Chinese journal of tuberculosis and respiratory diseases |
| Journal | Year | Title |
|---------|------|-------|
| Protein expression and purification | 2000 | The Journal of biological chemistry |
| | 2000 | The European respiratory journal |
| | 1999 | The Journal of asthma |
| | 1998 | Cancer letters |
| | 1998 | No shinkei geka. Neurological surgery |
| | 1996 | Gastroenterology |
| | 1992 | ArerugÄ« = [Allergy] |
| | 1992 | The European respiratory journal |
| | 1990 | Annals of allergy |
| | 1988 | The Pediatric infectious disease journal |
| | 1981 | British medical journal (Clinical research ed.) |
| | 1980 | Clinical allergy |
| | 1978 | Gastroenterologia Japonica |
| | 1976 | Lancet |
| | 2012 | Toxicological sciences |
| | 2012 | Respiratory research |
| | 2012 | International journal of otolaryngology |
| | 2012 | Indian journal of pediatrics |
| | 2012 | PloS one |
| | 2011 | CasopÅ¡i Î­Á©karl+Å‘ cl+eskÅ¡ch |
| | 2012 | Pediatric allergy and immunology |
| | 2011 | PloS one |
| | 2011 | International journal of molecular medicine |
| | 2011 | Biomedical engineering online |
| | 2010 | Current opinion in investigational drugs (London, England: 2000) |
| | 2010 | Chemical & pharmaceutical bulletin |
| | 2010 | Lung |
| | 2009 | The Journal of asthma |
| | 1993 | Revista alergia Mexico (Tecamachalco, Puebla, Mexico: 1993) |
| | 1993 | Revista alergia Mexico (Tecamachalco, Puebla, Mexico: 1993) |
| | 1993 | Revista alergia Mexico (Tecamachalco, Puebla, Mexico: 1993) |
| | 2008 | ArerugÄ« = [Allergy] |
| | 2009 | The European respiratory journal |
| | 1993 | Revista alergia Mexico (Tecamachalco, Puebla, Mexico: 1993) |
| | 2008 | Life sciences |
| | 2008 | American journal of epidemiology |
| | 2008 | Journal of cellular and molecular medicine |
| | 2009 | The Journal of asthma |
| Cp  | 105 | 18242596 | 2008 | European journal of pharmacology |
| Cp  | 105 | 18188083 | 2008 | Journal of occupational and environmental medicine |
| Cp  | 105 | 19462122 | 2007 | Revista brasileira de anestesiologia |
| Cp  | 105 | 17384874 | 2007 | Singapore medical journal |
| Cp  | 105 | 17287299 | 2007 | Thorax |
| Cp  | 105 | 17251674 | 2007 | Circulation journal |
| Cp  | 105 | 17124849 | 2006 | Equine veterinary journal |
| Cp  | 105 | 17121872 | 2007 | Thorax |
| Cp  | 105 | 16801164 | 2006 | Acta paediatrica (Oslo, Norway : 1992). Supplement |
| Cp  | 105 | 16624877 | 2006 | Proceedings of the National Academy of Sciences of the United States of America |
| Cp  | 105 | 16613702 | 2006 | Chinese journal of contemporary pediatrics |
| Cp  | 105 | 16575135 | 2006 | Georgian medical news |
| Cp  | 105 | 16395708 | 2006 | International journal of cancer. Journal international du cancer |
| Cp  | 105 | 16158778 | 2006 | Respiratory medicine |
| Cp  | 105 | 15946835 | 2006 | Pediatric allergy and immunology |
| Cp  | 105 | 15753914 | 2005 | The Journal of allergy and clinical immunology |
| Cp  | 105 | 15659480 | 2005 | BMJ (Clinical research ed.) |
| Cp  | 105 | 15598725 | 2005 | Journal of epidemiology and community health |
| Cp  | 105 | 15575487 | 2004 | Seminars in perinatology |
| Cp  | 105 | 15482516 | 2004 | Pediatric allergy and immunology |
| Cp  | 105 | 15477001 | 2004 | Patient education and counseling |
| Cp  | 105 | 15286255 | 2004 | Pediatrics |
| Cp  | 105 | 15241925 | NA | Zeitschrift fÃ¼r Naturforschung. C, Journal of biosciences |
| Cp  | 105 | 15066221 | 2004 | Acta pharmacologica Sinica |
| Cp  | 105 | 14968984 | NA | Revista alergia Mexico (Tecamachalco, Puebla, Mexico : 1993) |
| Cp  | 105 | 14964011 | 2003 | SantÃ© publique (Vandoeuvre-l'Ã¨s-Nancy, France) |
| Cp  | 105 | 12940106 | NA | Revista alergia Mexico (Tecamachalco, Puebla, Mexico : 1993) |
| Cp  | 105 | 12822543 | NA | Revista alergia Mexico (Tecamachalco, Puebla, Mexico : 1993) |
| Cp  | 105 | 12822542 | NA | Revista alergia Mexico (Tecamachalco, Puebla, Mexico : 1993) |
| Cp  | 105 | 12530578 | 2002 | Pathology, research and practice |
| Cp  | 105 | 12441327 | 2002 | Journal of the National Cancer Institute |
| Cp  | 105 | 12371533 | 2002 | Journal of investigational allergology & clinical immunology |
| Cp  | 105 | 12205810 | 2002 | Archives de PÃ©diatrie |
| Cp  | 105 | 12011732 | 2002 | Revue d'Ã©pidÃ©miologie et de santÃ© publique |
| Cp  | 105 | 11961081 | 2002 | The Journal of pharmacology and experimental therapeutics |
| Cp  | 105 | 11862756 | 2002 | Nihon yakurigaku zasshi. Folia pharmacologica Japonica |
| Cp  | 105 | 11721274 | 2001 | Annals of the Academy of Medicine, Singapore |
| Cp  | 105 | 11668926 | 2001 | Australian health review |
| Cp  | 105 | 11602515 | 2001 | Drug metabolism and disposition: the biological fate of chemicals |
| Cp  | 105 | 11426850 | 2001 | European journal of pharmacology |
|-----|-----|----------|------|----------------------------------|
| Cp  | 105 | 11401872 | 2001 | American journal of respiratory and critical care medicine |
| Cp  | 105 | 11273793 | 2001 | Pulmonary pharmacology & therapeutics |
| Cp  | 105 | 11171871 | 2001 | International journal of epidemiology |
| Cp  | 105 | 11003986 | 2000 | American journal of physiology. Regulatory, integrative and comparative physiology |
| Cp  | 105 | 10988132 | 2000 | American journal of respiratory and critical care medicine |
| Cp  | 105 | 10903239 | 2000 | American journal of respiratory and critical care medicine |
| Cp  | 105 | 10891017 | 2000 | Archives of pediatrics & adolescent medicine |
| Cp  | 105 | 10710030 | 2000 | Archives of pediatrics & adolescent medicine |
| Cp  | 105 | 10611439 | 1999 | European journal of pharmacology |
| Cp  | 105 | 10468306 | 1999 | British journal of cancer |
| Cp  | 105 | 10235630 | 1999 | Regulatory peptides |
| Cp  | 105 | 9927373 | 1999 | American journal of respiratory and critical care medicine |
| Cp  | 105 | 9723564 | 1998 | Annals of allergy, asthma & immunology |
| Cp  | 105 | 9400681 | 1997 | Respiriology (Carlton, Vic.) |
| Cp  | 105 | 9353399 | 1997 | The Journal of pharmacology and experimental therapeutics |
| Cp  | 105 | 11498865 | 1997 | Acta pharmacuetica Sinica |
| Cp  | 105 | 9234081 | 1997 | Journal of autonomic pharmacology |
| Cp  | 105 | 8836335 | 1996 | Allergy |
| Cp  | 105 | 8567958 | 1996 | The Journal of clinical investigation |
| Cp  | 105 | 7663799 | 1995 | American journal of respiratory and critical care medicine |
| Cp  | 105 | 8846432 | 1995 | Canadian journal of physiology and pharmacology |
| Cp  | 105 | 7735167 | 1995 | Nuclear medicine and biology |
| Cp  | 105 | 8121098 | 1993 | Nihon KyÅ bu Shikkan Gakkai zasshi |
| Cp  | 105 | 7693493 | 1993 | European journal of pharmacology |
| Cp  | 105 | 7692490 | 1993 | Regulatory peptides |
| Cp  | 105 | 7902346 | 1993 | The Journal of asthma |
| Cp  | 105 | 1525326 | 1992 | Cancer causes & control : CCC |
| Cp  | 105 | 1990954 | 1991 | The American review of respiratory disease |
| Cp  | 105 | 2251634 | 1990 | South African medical journal |
| Cp  | 105 | 2247790 | 1990 | South African medical journal |
| Cp  | 105 | 2339312 | 1990 | South African medical journal |
| Cp  | 105 | 2896105 | 1988 | Chest |
| Cp  | 105 | 3340935 | 1988 | South African medical journal |
| Cp  | 105 | 2443279 | 1987 | Clinica chimica acta |
| Cp  | 105 | 6233230 | 1984 | International journal of immunopharmacology |
| Cp  | 105 | 7065516 | 1982 | The American review of respiratory disease |
| Cp  | 105 | 7129659 | 1982 | International archives of allergy and applied immunology |
| Cp  | 105 | 13094 | 1977 | The Journal of allergy and clinical immunology |
| Cp  | 105 | 993478 | 1976 | The Journal of allergy and clinical immunology |

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| Gene | ID | Year | Journal |
|------|----|------|---------|
| Pigri | 1  | 22240167 | 2012 | Biochimica et biophysica acta |
| C1qb | 0  | 0    |        |
| Bst1  | 0  | 0    |        |
| Muc1  | 6  | 21605280 | 2011 | Pediatrics international : official journal of the Japan Pediatric Society |
| Muc1  | 6  | 20348949 | 2010 | Oncogene |
| Muc1  | 6  | 16990615 | 2007 | American journal of respiratory cell and molecular biology |
| Muc1  | 6  | 16630149 | 2006 | Clinical and experimental allergy |
| Muc1  | 6  | 11802251 | 2002 | Pediatric pulmonology |
| Muc1  | 6  | 11062147 | 2000 | American journal of respiratory cell and molecular biology |
| Lgals3bp | 1 | 15562889 | 2004 | Annals of allergy, asthma & immunology |
| Hvcn1 | 1  | 19958596 | NA   | American journal of rhinology & allergy |
| S1c6a20a | 0 | 0    |        |
| Orm1  | 10 | 23096927 | 2012 | Genetics and molecular research : GMR |
| Orm1  | 10 | 22986918 | 2012 | The pharmacogenomics journal |
| Orm1  | 10 | 22694930 | 2012 | The Journal of allergy and clinical immunology |
| Orm1  | 10 | 22535525 | 2012 | Molecular biology of the cell |
| Orm1  | 10 | 22271045 | 2012 | Human genetics |
| Orm1  | 10 | 22069270 | 2011 | Diabetes/metabolism research and reviews |
| Orm1  | 10 | 22017802 | 2012 | International journal of immunogenetics |
| Orm1  | 10 | 20182505 | 2010 | Nature |
| Orm1  | 10 | 19133921 | 2009 | Allergy |
| Orm1  | 10 | 18155279 | 2008 | The Journal of allergy and clinical immunology |
| Orm2  | 2  | 22535525 | 2012 | Molecular biology of the cell |
| Orm2  | 2  | 20182505 | 2010 | Nature |
| Bcl2a1d | 0  | 0    |        |
| Bcl2a1a | 0  | 0    |        |
| Bcl2a1b | 0  | 0    |        |
| Csf2rb2 | 1 | 21841801 | 2011 | Nature |
| Tifa   | 0  | 0    |        |
| Itgax  | 58 | 22585735 | 2012 | The Journal of experimental medicine |
| Itgax  | 58 | 22388091 | 2012 | Nature medicine |
| Itgax  | 58 | 22110701 | 2011 | PloS one |
| Itgax  | 58 | 21985360 | 2011 | Clinical and experimental immunology |
| Itgax  | 58 | 21646790 | 2011 | International archives of allergy and immunology |
| Itgax  | 58 | 21634009 | 2011 | EMBO molecular medicine |
| Itgax  | 58 | 21538995 | 2011 | EMBO molecular medicine |
| Itgax  | 58 | 21477339 | 2011 | Respiratory research |
| Itgax  | 58 | 21402950 | 2011 | Proceedings of the National Academy of Sciences of the United States of America |
| Itgax  | 58 | 21274737 | 2011 | Inflammation research |
| Itgax  | 58 | 21268008 | 2011 | European journal of immunology |
| Itgax  | 58 | 21231886 | 2011 | Immunopharmacology and immunotoxicology |
| Itgax | 58 | 21135031 | 2011 | International immunology |
|-------|----|----------|------|--------------------------|
| Itgax | 58 | 20819092 | 2010 | Clinical and experimental immunology |
| Itgax | 58 | 20659336 | 2010 | Respiratory research |
| Itgax | 58 | 20622891 | 2010 | Cellular & molecular immunology |
| Itgax | 58 | 20581095 | 2011 | American journal of respiratory cell and molecular biology |
| Itgax | 58 | 20375632 | 2010 | Journal of infection in developing countries |
| Itgax | 58 | 20214669 | 2010 | Clinical and experimental allergy |
| Itgax | 58 | 20194813 | 2010 | American journal of respiratory and critical care medicine |
| Itgax | 58 | 20179765 | 2010 | PloS one |
| Itgax | 58 | 20118218 | 2011 | American journal of respiratory cell and molecular biology |
| Itgax | 58 | 20085598 | 2009 | Clinical and experimental allergy |
| Itgax | 58 | 20016195 | 2010 | International archives of allergy and immunology |
| Itgax | 58 | 19933379 | 2010 | American journal of respiratory cell and molecular biology |
| Itgax | 58 | 19901344 | 2010 | American journal of respiratory cell and molecular biology |
| Itgax | 58 | 19877020 | 2009 | European journal of immunology |
| Itgax | 58 | 19828636 | 2009 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgax | 58 | 19628980 | 2009 | Allergology international |
| Itgax | 58 | 19553159 | 2009 | Clinical immunology (Orlando, Fla.) |
| Itgax | 58 | 19494498 | 2009 | International archives of allergy and immunology |
| Itgax | 58 | 19464382 | 2009 | Pulmonary pharmacology & therapeutics |
| Itgax | 58 | 19448155 | 2010 | American journal of respiratory cell and molecular biology |
| Itgax | 58 | 19155511 | 2009 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgax | 58 | 18835962 | 2009 | Thorax |
| Itgax | 58 | 18594149 | 2008 | International archives of allergy and immunology |
| Itgax | 58 | 18498542 | 2008 | Clinical and experimental allergy |
| Itgax | 58 | 18209085 | 2008 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgax | 58 | 17977814 | 2007 | International immunology |
| Itgax | 58 | 17512567 | 2007 | Toxicology and applied pharmacology |
| Itgax | 58 | 17506035 | 2007 | European journal of immunology |
| Itgax | 58 | 17460444 | 2007 | Allergology international |
| Itgax | 58 | 17210044 | 2007 | Clinical and experimental allergy |
| Itgax | 58 | 16455972 | 2006 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgax | 58 | 16424176 | 2006 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgax | 58 | 16314434 | 2005 | The Journal of experimental medicine |
| Itgax | 58 | 15944318 | 2005 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgax | 58 | 15781587 | 2005 | The Journal of experimental medicine |
| Itgax | 58 | 15196283 | 2004 | Clinical and experimental allergy |
| Itgax | 58 | 15096186 | 2004 | Immunology |
| Itgax | 58 | 12702544 | 2003 | American journal of respiratory cell and molecular biology |
| Itgax | 58 | 12603602 | 2003 | Immunology |
| Itgax | 58 | 12393720 | 2002 | Blood |
|-------|----|----------|------|-------|
| Itgax | 58 | 11869687 | 2002 | Immunity |
| Itgax | 58 | 10688435 | 1999 | Allergy |
| Itgax | 58 | 9450145 | 1997 | Allergy |
| Itgax | 58 | 7596088 | 1995 | The Kurume medical journal |
| II1rn | 34 | 21622869 | 2011 | Journal of immunology (Baltimore, Md. : 1950) |
| II1rn | 34 | 21252117 | 2011 | Carcinogenesis |
| II1rn | 34 | 20523065 | 2010 | International archives of allergy and immunology |
| II1rn | 34 | 19768973 | NA | Revista alergia Mexico (Tecamachalco, Puebla, Mexico : 1993) |
| II1rn | 34 | 19149188 | 2008 | Chinese journal of biotechnology |
| II1rn | 34 | 19087723 | 2008 | Zhonghua yi xue za zhi |
| II1rn | 34 | 18959005 | 2008 | Journal of molecular cell biology |
| II1rn | 34 | 18926055 | NA | Allergy and asthma proceedings |
| II1rn | 34 | 18810365 | 2008 | Indian journal of pediatrics |
| II1rn | 34 | 17116976 | 2006 | Journal of pharmacological sciences |
| II1rn | 34 | 17107994 | 2007 | The European respiratory journal |
| II1rn | 34 | 17021861 | 2006 | Immunogenetics |
| II1rn | 34 | 16724092 | 2006 | Gene therapy |
| II1rn | 34 | 16519819 | 2006 | BMC medical genetics |
| II1rn | 34 | 16409203 | 2006 | Allergy |
| II1rn | 34 | 15539764 | 2005 | Biology of the neonate |
| II1rn | 34 | 15020290 | 2004 | American journal of respiratory and critical care medicine |
| II1rn | 34 | 14730914 | 2003 | Yao xue xue bao = Acta pharmaceutica Sinica |
| II1rn | 34 | 14519149 | 2003 | Clinical and experimental allergy |
| II1rn | 34 | 12938145 | 2003 | Journal of clinical laboratory analysis |
| II1rn | 34 | 12663678 | 2003 | International immunology |
| II1rn | 34 | 12467523 | 2002 | Mediators of inflammation |
| II1rn | 34 | 11360527 | 1998 | Chinese journal of tuberculosis and respiratory diseases |
| II1rn | 34 | 11027520 | 2000 | Biochemical and biophysical research communications |
| II1rn | 34 | 10843772 | 2000 | Cytokine |
| II1rn | 34 | 10667111 | NA | ThÃ©rapie |
| II1rn | 34 | 10487780 | 1999 | The Journal of clinical investigation |
| II1rn | 34 | 9949321 | 1999 | The Journal of allergy and clinical immunology |
| II1rn | 34 | 9927362 | 1999 | American journal of respiratory and critical care medicine |
| II1rn | 34 | 9811535 | 1998 | Cytokine |
| II1rn | 34 | 8887608 | 1996 | American journal of respiratory and critical care medicine |
| II1rn | 34 | 8870701 | 1996 | Clinical and experimental immunology |
| II1rn | 34 | 7631820 | 1995 | The American journal of physiology |
| II1rn | 34 | 8038709 | 1994 | Receptor |
| Chi3l1 | 35 | 23190377 | 2012 | The Journal of asthma |
| Chi3l1 | 35 | 22857879 | 2012 | The Journal of allergy and clinical immunology |
| Journal Title | Year | Volume | Issue | Title |
|---------------|------|--------|-------|-------|
| The Biochemical journal | 2012 | 35 | 22742450 | Biochemical and biophysical research communications |
| Proceedings of the American Thoracic Society | 2012 | 35 | 22550243 | The Journal of allergy and clinical immunology |
| Cytokine | 2012 | 35 | 22550243 | American journal of respiratory and critical care medicine |
| Respiratory; international review of thoracic diseases | 2012 | 35 | 21968467 | Multiple sclerosis (Houndmills, Basingstoke, England) |
| PloS one | 2011 | 35 | 21530869 | Annual review of physiology |
| Current opinion in allergy and clinical immunology | 2010 | 35 | 20650887 | The Journal of biological chemistry |
| American journal of respiratory and critical care medicine | 2010 | 35 | 20538957 | The European respiratory journal |
| Respiratory medicine | 2010 | 35 | 20356987 | Allergy, asthma & immunology research |
| World journal of gastroenterology : WJG | 2009 | 35 | 19908331 | Current opinion in allergy and clinical immunology |
| PloS one | 2009 | 35 | 19564225 | PloS one |
| Current opinion in allergy and clinical immunology | 2009 | 35 | 19532094 | Current opinion in allergy and clinical immunology |
| PloS one | 2009 | 35 | 19421404 | Current opinion in allergy and clinical immunology |
| The Journal of experimental medicine | 2009 | 35 | 19414556 | Current opinion in allergy and clinical immunology |
| Clinical and experimental allergy | 2008 | 35 | 18498542 | Clinical and experimental allergy |
| The New England journal of medicine | 2008 | 35 | 18403760 | Current opinion in allergy and clinical immunology |
| The New England journal of medicine | 2008 | 35 | 18403759 | Current opinion in allergy and clinical immunology |
| MÂ©decine sciences : M/S | 2008 | 35 | 18334164 | Current opinion in allergy and clinical immunology |
| The New England journal of medicine | 2007 | 35 | 18003958 | Current opinion in allergy and clinical immunology |
| Veterinary immunology and immunopathology | 2007 | 35 | 17709146 | Current opinion in allergy and clinical immunology |
| The Keio journal of medicine | 2007 | 35 | 17392594 | Current opinion in allergy and clinical immunology |
| The Journal of allergy and clinical immunology | 2012 | 55 | 21943944 | Current opinion in allergy and clinical immunology |
| Diagnostic cytopathology | 2011 | 55 | 21681974 | Experimental animals / Japanese Association for Laboratory Animal Science |
| Journal of immunology (Baltimore, Md. : 1950) | 2010 | 55 | 20644177 | Experimental animals / Japanese Association for Laboratory Animal Science |
| Archives of pathology & laboratory medicine | 2009 | 55 | 19961259 | Experimental animals / Japanese Association for Laboratory Animal Science |
| American journal of rhinology & allergy | 2009 | 55 | 19490801 | Experimental animals / Japanese Association for Laboratory Animal Science |
| The Journal of asthma | 2009 | 55 | 19191129 | Experimental animals / Japanese Association for Laboratory Animal Science |
| Allergy | 2009 | 55 | 19132974 | Experimental animals / Japanese Association for Laboratory Animal Science |
| Author(s) | Year | Title | Journal |
|----------|------|-------|---------|
|           |      |       | Cd68 55 | 18681853 | 2008 | Clinical and experimental allergy |
|           |      |       | Cd68 55 | 18498542 | 2008 | Clinical and experimental allergy |
|           |      |       | Cd68 55 | 18268925 | 2007 | International journal of chronic obstructive pulmonary disease |
|           |      |       | Cd68 55 | 18250182 | 2008 | Thorax |
|           |      |       | Cd68 55 | 17441790 | 2007 | Allergy |
|           |      |       | Cd68 55 | 17272787 | 2007 | American journal of respiratory and critical care medicine |
|           |      |       | Cd68 55 | 17075272 | 2006 | Allergology international |
|           |      |       |Cd68 55  | 17035437 | 2006 | Chest |
|           |      |       |Cd68 55  | 16959617 | 2006 | Journal of the Formosan Medical Association = Taiwan yi zhi |
|           |      |       |Cd68 55  | 16899487 | 2006 | The European respiratory journal |
|           |      |       |Cd68 55  | 15805998 | 2005 | The Journal of allergy and clinical immunology |
|           |      |       |Cd68 55  | 15784110 | 2005 | Clinical and experimental allergy |
|           |      |       |Cd68 55  | 15510586 | NA    | Allergy and asthma proceedings |
|           |      |       |Cd68 55  | 14564360 | 2003 | The Journal of allergy and clinical immunology |
|           |      |       |Cd68 55  | 12212952 | 2002 | The European respiratory journal |
|           |      |       |Cd68 55  | 12149529 | 2002 | Thorax |
|           |      |       |Cd68 55  | 12070058 | 2002 | American journal of respiratory and critical care medicine |
|           |      |       |Cd68 55  | 12028114 | 2002 | Allergy |
|           |      |       |Cd68 55  | 11972605 | 2002 | Clinical and experimental allergy |
|           |      |       |Cd68 55  | 11502664 | 2001 | Chest |
|           |      |       |Cd68 55  | 11199094 | 2001 | Novartis Foundation symposium |
|           |      |       |Cd68 55  | 11182013 | 2001 | Thorax |
|           |      |       |Cd68 55  | 11069834 | 2000 | American journal of respiratory and critical care medicine |
|           |      |       |Cd68 55  | 11031340 | 2000 | The Journal of allergy and clinical immunology |
|           |      |       |Cd68 55  | 10984367 | 2000 | The Journal of allergy and clinical immunology |
|           |      |       |Cd68 55  | 10843939 | 2000 | Chest |
|           |      |       |Cd68 55  | 10573219 | 1999 | The European respiratory journal |
|           |      |       |Cd68 55  | 10570327 | 1999 | Journal of immunology (Baltimore, Md. : 1950) |
|           |      |       |Cd68 55  | 10556105 | 1999 | American journal of respiratory and critical care medicine |
|           |      |       |Cd68 55  | 10394103 | 1999 | International archives of allergy and immunology |
|           |      |       |Cd68 55  | 10362043 | 1999 | The European respiratory journal |
|           |      |       |Cd68 55  | 10193369 | 1998 | Thorax |
|           |      |       |Cd68 55  | 9257786  | 1997 | The Journal of allergy and clinical immunology |
|           |      |       |Cd68 55  | 9155834  | 1997 | The Journal of allergy and clinical immunology |
|           |      |       |Cd68 55  | 9150325  | 1997 | The European respiratory journal |
|           |      |       |Cd68 55  | 9117016  | 1997 | American journal of respiratory and critical care medicine |
|           |      |       |Cd68 55  | 8970374  | 1996 | American journal of respiratory and critical care medicine |
|           |      |       |Cd68 55  | 8887608  | 1996 | American journal of respiratory and critical care medicine |
|           |      |       |Cd68 55  | 8680684  | 1996 | American journal of respiratory and critical care medicine |
|           |      |       |Cd68 55  | 8630259  | 1996 | American journal of respiratory cell and molecular biology |
|           |      |       |Cd68 55  | 7668997  | 1995 | ArerugÄ« = [Allergy] |
| Gene | Publication Year | Journal Title |
|------|-----------------|---------------|
| Cd68 | 1995 | American journal of respiratory cell and molecular biology |
| Cd68 | 1993 | American journal of respiratory cell and molecular biology |
| Cd68 | 1992 | The American review of respiratory disease |
| Cd68 | 1992 | The Journal of allergy and clinical immunology |
| Gatm | NA | International archives of allergy and immunology |
| Olfm1 | NA | Journal of investigational allergology & clinical immunology |
| Sirpa | NA | Journal of investigational allergology & clinical immunology |
| Ptgs1 | 2012 | Journal of allergy |
| Ptgs1 | 2012 | Allergology international |
| Ptgs1 | 2012 | Journal of ethnopharmacology |
| Ptgs1 | 2012 | Expert opinion on therapeutic targets |
| Ptgs1 | 2012 | Journal of allergy |
| Ptgs1 | 2011 | Journal of pharmacokinetics and pharmacodynamics |
| Ptgs1 | 2010 | The Journal of dermatology |
| Ptgs1 | 2011 | Current drug targets |
| Ptgs1 | 2010 | Journal of immunology (Baltimore, Md.: 1950) |
| Ptgs1 | 2011 | Journal of ethnopharmacology |
| Ptgs1 | 2010 | NA | Pharmacological reports : PR |
| Ptgs1 | 2010 | Chemical immunology and allergy |
| Ptgs1 | 2009 | Immunology and allergy clinics of North America |
| Ptgs1 | 2009 | Annual review of physiology |
| Ptgs1 | 2009 | The European respiratory journal Physiology |
| Ptgs1 | 2009 | Allergy |
| Ptgs1 | 2009 | The Journal of allergy and clinical immunology |
| Ptgs1 | 2008 | FASEB journal |
| Ptgs1 | 2007 | The Annals of pharmacotherapy |
| Ptgs1 | 2007 | Allergy |
| Ptgs1 | 2007 | DNA sequence |
| Ptgs1 | 2007 | The Journal of allergy and clinical immunology |
| Ptgs1 | 2006 | Current allergy and asthma reports |
| Ptgs1 | 2006 | European journal of pharmacology |
| Ptgs1 | 2005 | Bulletin de l'Académie nationale de médecine |
| Ptgs1 | 2005 | The European respiratory journal |
| Ptgs1 | 2004 | JAMA : the journal of the American Medical Association |
| Ptgs1 | 2004 | Annals of allergy, asthma & immunology monologue |
| Ptgs1 | 2004 | The Journal of allergy and clinical immunology |
| Ptgs1 | 2004 | The Journal of biological chemistry |
| Ptgs1 | 2004 | Immunology and allergy clinics of North America |
| Ptgs1 | 2004 | American journal of respiratory and critical care medicine |
| Ptgs1 | 65 | 15100686 | 2004 | The Journal of allergy and clinical immunology |
|-------|----|----------|------|-----------------------------------------------|
| Ptgs1 | 65 | 14769263 | 2004 | Current allergy and asthma reports             |
| Ptgs1 | 65 | 14680616 | 2004 | Current allergy and asthma reports             |
| Ptgs1 | 65 | 14600429 | 2003 | International archives of allergy and immunology |
| Ptgs1 | 65 | 14561202 | 2002 | Current drug targets. Inflammation and allergy |
| Ptgs1 | 65 | 14552699 | NA   | International journal of immunopathology and pharmacology |
| Ptgs1 | 65 | 12895598 | NA   | Prostaglandins, leukotrienes, and essential fatty acids |
| Ptgs1 | 65 | 12796206 | 2003 | Chest                                          |
| Ptgs1 | 65 | 12743569 | 2003 | The Journal of allergy and clinical immunology |
| Ptgs1 | 65 | 12668895 | 2003 | Clinical reviews in allergy & immunology       |
| Ptgs1 | 65 | 12576199 | 2003 | Journal of ethnopharmacology                   |
| Ptgs1 | 65 | 12529163 | 2003 | Paediatric drugs                               |
| Ptgs1 | 65 | 12487218 | 2002 | Annals of allergy, asthma & immunology         |
| Ptgs1 | 65 | 12429575 | 2002 | British journal of pharmacology                |
| Ptgs1 | 65 | 11952135 | 2002 | Viral immunology                               |
| Ptgs1 | 65 | 11943670 | 2002 | American journal of physiology. Lung cellular and molecular physiology |
| Ptgs1 | 65 | 11940059 | 2002 | Clinical and experimental allergy              |
| Ptgs1 | 65 | 11860351 | 2002 | Current medicinal chemistry                    |
| Ptgs1 | 65 | 11694451 | 2001 | American journal of respiratory cell and molecular biology |
| Ptgs1 | 65 | 11447381 | 2001 | The Journal of allergy and clinical immunology |
| Ptgs1 | 65 | 11394934 | 2001 | Pharmacological research                       |
| Ptgs1 | 65 | 11273789 | 2001 | Pulmonary pharmacology & therapeutics          |
| Ptgs1 | 65 | 11251623 | 2001 | Clinical and experimental allergy              |
| Ptgs1 | 65 | 11251618 | 2001 | Clinical and experimental allergy              |
| Ptgs1 | 65 | 11237998 | 2001 | American journal of physiology. Lung cellular and molecular physiology |
| Ptgs1 | 65 | 11152649 | 2001 | American journal of respiratory cell and molecular biology |
| Ptgs1 | 65 | 10992560 | 2000 | Thorax                                         |
| Ptgs1 | 65 | 10400832 | 1999 | The Journal of allergy and clinical immunology |
| Ptgs1 | 65 | 10390414 | 1999 | American journal of respiratory and critical care medicine |
| Ptgs1 | 65 | 9846651  | 1998 | British journal of pharmacology                |
| Ptgs1 | 65 | 9761007  | 1998 | Clinical and experimental allergy              |
| Ptgs1 | 65 | 9416556  | NA   | Journal of investigational allergology & clinical immunology |
| Ccl9  | 4  | 20622891 | 2010 | Cellular & molecular immunology                |
| Ccl9  | 4  | 16339523 | 2005 | Journal of immunology (Baltimore, Md.: 1950)  |
| Ccl9  | 4  | 15585884 | 2004 | Journal of immunology (Baltimore, Md.: 1950)  |
| Ccl9  | 4  | 15203102 | 2004 | The international journal of biochemistry & cell biology |
| Ccl6  | 8  | 20622891 | 2010 | Cellular & molecular immunology                |
| Ccl6  | 8  | 18156208 | 2008 | The American journal of pathology             |
| Ccl6  | 8  | 17168792 | 2006 | Inflammation & allergy drug targets           |
| Ccl6  | 8  | 16645178 | 2006 | American journal of respiratory cell and molecular biology |
| Gene  | NCBI  | Year | Journal                                                                 |
|-------|-------|------|--------------------------------------------------------------------------|
| Ccl6  | 8     | 2006 | Laboratory investigation; a journal of technical methods and pathology   |
| Ccl6  | 8     | 2005 | Occupational medicine (Oxford, England)                                  |
| Ccl6  | 8     | 2004 | Journal of immunology (Baltimore, Md.: 1950)                             |
| Ccl6  | 8     | 2005 | American journal of respiratory and critical care medicine               |
| 1100001G20Rik | 0 | 0    |                                                                            |
| Bpifb1 | 0     | 0    |                                                                            |
| Procr | 1     | 2004 | Blood                                                                     |
| Lbp   | 10    | 2012 | The Journal of allergy and clinical immunology                           |
| Lbp   | 10    | 2010 | The Journal of allergy and clinical immunology                           |
| Lbp   | 10    | 2006 | BMC pulmonary medicine                                                   |
| Lbp   | 10    | 2006 | BMC musculoskeletal disorders                                            |
| Lbp   | 10    | 2004 | The Journal of allergy and clinical immunology                           |
| Lbp   | 10    | 2002 | American journal of respiratory cell and molecular biology               |
| Lbp   | 10    | 2001 | Toxicology and applied pharmacology                                      |
| Lbp   | 10    | 2001 | Journal of immunology (Baltimore, Md.: 1950)                             |
| Lbp   | 10    | 1996 | The American journal of physiology                                       |
| Lbp   | 10    | 1996 | Nihon rinsho. Japanese journal of clinical medicine                      |
| Rab20 | 0     | 0    |                                                                            |
| F10   | 4     | 2012 | Experimental and therapeutic medicine                                    |
| F10   | 4     | 2012 | Mycopathologia                                                            |
| F10   | 4     | 2008 | Cancer research                                                           |
| F10   | 4     | 2005 | Respiratory research                                                     |
| Naip2 | 0     | 0    |                                                                            |
| Cd14  | 179   | 2012 | Pediatric allergy and immunology                                         |
| Cd14  | 179   | 2012 | Journal of investigational allergology & clinical immunology             |
| Cd14  | 179   | 2012 | Journal of investigational allergology & clinical immunology             |
| Cd14  | 179   | 2012 | Allergy                                                                   |
| Cd14  | 179   | 2012 | Journal of human genetics                                                 |
| Cd14  | 179   | 2012 | The Journal of asthma                                                    |
| Cd14  | 179   | 2012 | Clinical and experimental allergy                                        |
| Cd14  | 179   | 2011 | Archives of medical science : AMS                                         |
| Cd14  | 179   | 2011 | Asian Pacific journal of allergy and immunology                           |
| Cd14  | 179   | 2011 | International journal of immunopathology and pharmacology                |
| Cd14  | 179   | 2011 | Respiratory medicine                                                     |
| Cd14  | 179   | 2011 | Journal of investigational allergology & clinical immunology             |
| Cd14  | 179   | 2011 | Molecular medicine reports                                               |
| Cd14  | 179   | 2011 | Pediatric allergy and immunology                                         |
| Cd14  | 179   | 2011 | BMC medical genetics                                                     |
| Cd14  | 179   | 2011 | International archives of allergy and immunology                          |
| Cd14  | 179   | 2011 | The Journal of allergy and clinical immunology                           |
| Cd14  | 179   | 2011 | Occupational and environmental medicine                                  |
| Cd14 | 179 | 21325943 | 2011 | Current opinion in allergy and clinical immunology |
|------|-----|----------|------|-----------------------------------------------|
| Cd14 | 179 | 21324477 | 2011 | The Journal of pediatrics |
| Cd14 | 179 | 21274737 | 2011 | Inflammation research |
| Cd14 | 179 | 21079949 | 2011 | Immunogenetics |
| Cd14 | 179 | 21039977 | 2010 | Clinical and experimental allergy |
| Cd14 | 179 | 21039600 | 2011 | Allergy |
| Cd14 | 179 | 20726961 | 2011 | Allergy |
| Cd14 | 179 | 20608916 | 2011 | Allergy |
| Cd14 | 179 | 20618347 | 2010 | Clinical and experimental allergy |
| Cd14 | 179 | 20579716 | 2010 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 2054656 | 2010 | Human genetics |
| Cd14 | 179 | 20536280 | 2010 | The Journal of asthma |
| Cd14 | 179 | 20394509 | 2010 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 20384875 | 2010 | Scandinavian journal of immunology |
| Cd14 | 179 | 20302606 | 2010 | Respiratory research |
| Cd14 | 179 | 20179765 | 2010 | PloS one |
| Cd14 | 179 | 20126925 | 2009 | Jornal brasileiro de pneumologia |
| Cd14 | 179 | 20085599 | 2009 | Clinical and experimental allergy |
| Cd14 | 179 | 20080799 | 2010 | Proceedings of the National Academy of Sciences of the United States of America |
| Cd14 | 179 | 20051845 | 2010 | Current opinion in allergy and clinical immunology |
| Cd14 | 179 | 19968655 | 2010 | Clinical and experimental allergy |
| Cd14 | 179 | 19883332 | 2009 | Expert review of anti-infective therapy |
| Cd14 | 179 | 19825525 | 2009 | European cytokine network |
| Cd14 | 179 | 19796192 | 2010 | Allergy |
| Cd14 | 179 | 19785013 | 2009 | Stem cells (Dayton, Ohio) |
| Cd14 | 179 | 19462345 | 2009 | Pneumonologia i alergologia polska |
| Cd14 | 179 | 19372244 | 2010 | American journal of respiratory cell and molecular biology |
| Cd14 | 179 | 19361972 | 2009 | Respiratory medicine |
| Cd14 | 179 | 19254290 | 2009 | Allergy |
| Cd14 | 179 | 19222419 | 2009 | Allergy |
| Cd14 | 179 | 19191129 | 2009 | The Journal of asthma |
| Cd14 | 179 | 19148143 | 2009 | Genes and immunity |
| Cd14 | 179 | 19119705 | 2008 | Annals of allergy, asthma & immunology |
| Cd14 | 179 | 19109137 | 2009 | Journal of immunology (Baltimore, Md. : 1950) |
| Cd14 | 179 | 19096003 | 2009 | American journal of respiratory and critical care medicine |
| Cd14 | 179 | 18952503 | 2009 | Clinical immunology (Orlando, Fla.) |
| Cd14 | 179 | 18931892 | 2009 | Journal of clinical immunology |
| Cd14 | 179 | 18774388 | 2008 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 18714537 | 2008 | Journal of investigational allergology & clinical immunology |
| Cd14 | 179 | 18446588 | 2008 | The Journal of asthma : official journal of the Association for the Care of Asthma |
| Cd14 | 179 | 18426139 | 2008 | Annals of allergy, asthma & immunology |
| Cd14 | 179 | 18425216 | NA | Jornal de pediatria |
| Cd14 | 179 | 18417506 | 2008 | The European respiratory journal |
| Cd14 | 179 | 18312481 | 2008 | Current opinion in allergy and clinical immunology |
| Cd14 | 179 | 17989521 | 2007 | Immunobiology |
| Cd14 | 179 | 17954484 | 2007 | Jornal de pediatria |
| Cd14 | 179 | 17951166 | 2007 | Folia histochemica et cytobiologica |
| Cd14 | 179 | 17919709 | 2007 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 17910328 | 2007 | Annals of allergy, asthma & immunology |
| Cd14 | 179 | 17823973 | 2007 | Clinical and experimental allergy |
| Cd14 | 179 | 17607003 | 2007 | Proceedings of the American Thoracic Society |
| Cd14 | 179 | 17581207 | 2007 | Clinical and experimental allergy |
| Cd14 | 179 | 17574828 | 2007 | Respiratory medicine |
| Cd14 | 179 | 17456337 | 2007 | Zhonghua er ke za zhi. Chinese journal of pediatrics |
| Cd14 | 179 | 17349684 | 2007 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 17270707 | 2007 | Immunobiology |
| Cd14 | 179 | 17218815 | 2007 | Current opinion in allergy and clinical immunology |
| Cd14 | 179 | 17202288 | 2007 | Proceedings of the American Thoracic Society |
| Cd14 | 179 | 17201240 | 2006 | Annals of allergy, asthma & immunology |
| Cd14 | 179 | 17196641 | 2007 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 17175987 | 2006 | Pneumonologia i alergologia polska |
| Cd14 | 179 | 17083354 | 2006 | Clinical and experimental allergy |
| Cd14 | 179 | 17075287 | 2006 | Allergology international |
| Cd14 | 179 | 17042137 | 2006 | Annals of allergy, asthma & immunology |
| Cd14 | 179 | 17003960 | 2006 | Journal of human genetics |
| Cd14 | 179 | 16959617 | 2006 | Journal of the Formosan Medical Association |
| Cd14 | 179 | 16954783 | 2006 | Current opinion in allergy and clinical immunology |
| Cd14 | 179 | 16844729 | 2007 | Thorax |
| Cd14 | 179 | 16815140 | 2006 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 16771785 | 2006 | Pediatric allergy and immunology |
| Cd14 | 179 | 16630939 | 2006 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 16566859 | 2006 | Current allergy and asthma reports |
| Cd14 | 179 | 16543402 | 2006 | Journal of leukocyte biology |
| Cd14 | 179 | 16505608 | 2006 | Current opinion in allergy and clinical immunology |
| Cd14 | 179 | 16446545 | 2006 | International archives of allergy and immunology |
| Cd14 | 179 | 16446543 | 2006 | International archives of allergy and immunology |
| Cd14 | 179 | 16387800 | 2006 | American journal of respiratory and critical care medicine |
| Cd14 | 179 | 16310521 | 2006 | The Medical clinics of North America |
| Cd14 | 179 | 16266379 | 2005 | Allergy |
| Cd14 | 179 | 11890712 | 2002 | Clinical immunology (Orlando, Fla.) |
| Cd14 | 179 | 11753119 | 2002 | Current opinion in pulmonary medicine |
| Cd14 | 179 | 11732288 | 2001 | Pneumonologia i alergologia polska |
| Cd14 | 179 | 11590384 | 2001 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 11574751 | 2001 | International archives of allergy and immunology |
| Cd14 | 179 | 11521081 | 2001 | Journal of endotoxin research |
| Cd14 | 179 | 11398078 | 2001 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 11359627 | 2000 | British medical bulletin |
| Cd14 | 179 | 11306916 | NA  | International archives of allergy and immunology |
| Cd14 | 179 | 11282774 | 2001 | American journal of respiratory and critical care medicine |
| Cd14 | 179 | 11278629 | 2001 | The Journal of biological chemistry |
| Cd14 | 179 | 11159017 | 2000 | American journal of respiratory cell and molecular biology |
| Cd14 | 179 | 11104731 | 2000 | ToxicoLOGY |
| Cd14 | 179 | 11090937 | 2000 | The Israel Medical Association journal : IMAJ |
| Cd14 | 179 | 11022011 | 2000 | American journal of human genetics |
| Cd14 | 179 | 10919504 | 2000 | Allergy |
| Cd14 | 179 | 10907586 | 2000 | Clinics in chest medicine |
| Cd14 | 179 | 10809960 | 2000 | Immunology |
| Cd14 | 179 | 10804928 | 2000 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 10594539 | 1999 | Current opinion in immunology |
| Cd14 | 179 | 10587479 | 1999 | Pulmonary pharmacology & therapeutics |
| Cd14 | 179 | 10432289 | 1999 | The Journal of experimental medicine |
| Cd14 | 179 | 10069865 | 1999 | The Journal of allergy and clinical immunology |
| Cd14 | 179 | 9890612 | 1998 | Pediatric research |
| Cd14 | 179 | 9561931 | 1998 | Inflammation |
| Cd14 | 179 | 9551731 | 1998 | The European respiratory journal |
| Cd14 | 179 | 9450145 | 1997 | Allergy |
| Cd14 | 179 | 9212832 | 1997 | Journal of immunological methods |
| Cd14 | 179 | 9117017 | 1997 | American journal of respiratory and critical care medicine |
| Cd14 | 179 | 8967507 | 1996 | The American journal of physiology |
| Cd14 | 179 | 8475731 | 1996 | Mediators of inflammation |
| Cd14 | 179 | 7767539 | 1995 | American journal of respiratory and critical care medicine |
| Cd14 | 179 | 7812576 | 1995 | American journal of respiratory and critical care medicine |
| Cd14 | 179 | 8207248 | 1994 | Journal of immunology (Baltimore, Md. : 1950) |
| Cd14 | 179 | 8173641 | 1994 | Pediatric allergy and immunology |
| Cd14 | 179 | 8386056 | 1993 | Monaldi archives for chest disease |
| Cd200r1 | 0 | 0 | 0 | 0 |
| Mtm1 | 0 | 0 | 0 | 0 |
| Tlr7 | 36 | 23078048 | 2012 | Inflammation & allergy drug targets |
| Tlr7 | 36 | 22882449 | 2012 | Allergy |
|------|----|----------|------|---------|
| Tlr7 | 36 | 22857391 | 2012 | BMC medical genetics |
| Tlr7 | 36 | 22727330 | 2012 | Immunobiology |
| Tlr7 | 36 | 22657407 | 2012 | The Journal of allergy and clinical immunology |
| Tlr7 | 36 | 22491246 | 2012 | Journal of immunology (Baltimore, Md. : 1950) |
| Tlr7 | 36 | 22355409 | 2012 | PloS one |
| Tlr7 | 36 | 22125636 | 2011 | PloS one |
| Tlr7 | 36 | 22086297 | 2012 | Current allergy and asthma reports |
| Tlr7 | 36 | 22035076 | 2012 | British journal of pharmacology |
| Tlr7 | 36 | 21917654 | 2012 | Thorax |
| Tlr7 | 36 | 21748646 | 2011 | Methods in molecular biology (Clifton, N.J.) |
| Tlr7 | 36 | 21646801 | 2011 | International archives of allergy and immunology |
| Tlr7 | 36 | 21480211 | 2011 | European journal of immunology |
| Tlr7 | 36 | 21460120 | 2011 | American journal of physiology. Lung cellular and molecular physiology |
| Tlr7 | 36 | 21354507 | 2011 | Journal of immunology (Baltimore, Md. : 1950) |
| Tlr7 | 36 | 21375463 | 2011 | Expert opinion on therapeutic targets |
| Tlr7 | 36 | 21364926 | 2011 | PloS one |
| Tlr7 | 36 | 21335488 | 2011 | Journal of immunology (Baltimore, Md. : 1950) |
| Tlr7 | 36 | 21157038 | 2011 | The Journal of allergy and clinical immunology |
| Tlr7 | 36 | 21167577 | 2011 | The Journal of clinical investigation |
| Tlr7 | 36 | 21131420 | 2011 | Journal of immunology (Baltimore, Md. : 1950) |
| Tlr7 | 36 | 20412137 | 2010 | Clinical and experimental allergy |
| Tlr7 | 36 | 20410486 | 2010 | Journal of immunology (Baltimore, Md. : 1950) |
| Tlr7 | 36 | 20377514 | 2010 | Current medicinal chemistry |
| Tlr7 | 36 | 20224068 | 2010 | American journal of respiratory and critical care medicine |
| Tlr7 | 36 | 19735273 | 2009 | Clinical and experimental allergy |
| Tlr7 | 36 | 19643938 | 2010 | The European respiratory journal |
| Tlr7 | 36 | 19025588 | 2008 | Journal of neuroinflammation |
| Tlr7 | 36 | 18682521 | 2008 | Thorax |
| Tlr7 | 36 | 18220957 | 2007 | Inflammation & allergy drug targets |
| Tlr7 | 36 | 18031246 | 2007 | Biochemical Society transactions |
| Tlr7 | 36 | 18020622 | 2007 | BioDrugs : clinical immunotherapeutics, biopharmaceuticals and gene therapy |
| Tlr7 | 36 | 17548618 | 2007 | Journal of immunology (Baltimore, Md. : 1950) |
| Tlr7 | 36 | 17400732 | 2007 | American journal of respiratory and critical care medicine |
| Tlr7 | 36 | 16361354 | 2006 | American journal of physiology. Lung cellular and molecular physiology |
| Cybb | 4  | 22982469 | 2012 | Life sciences |
| Cybb | 4  | 17293377 | 2007 | American journal of physiology. Lung cellular and molecular physiology |
| Cybb | 4  | 16608528 | 2006 | Journal of negative results in biomedicine |
| Cybb | 4  | 14588148 | 2003 | Antioxidants & redox signaling |
| Atp6ap2 | 0  | 0       |      |               |
| Id2  | 0  | 0       |      |               |
| Slc26a4 | 9 | 22116372 | 2011 | Cellular physiology and biochemistry |
|--------|---|-----------|------|-------------------------------------|
| Slc26a4 | 9 | 22116359 | 2011 | Cellular physiology and biochemistry |
| Slc26a4 | 9 | 22116352 | 2011 | Cellular physiology and biochemistry |
| Slc26a4 | 9 | 21814192 | 2011 | Clinical pharmacology and therapeutics |
| Slc26a4 | 9 | 21045265 | 2010 | Disease markers |
| Slc26a4 | 9 | 19289392 | 2009 | Journal of medical genetics |
| Slc26a4 | 9 | 19028979 | 2009 | American journal of physiology. Lung cellular and molecular physiology |
| Slc26a4 | 9 | 18641360 | 2008 | Journal of immunology (Baltimore, Md. : 1950) |
| Slc26a4 | 9 | 18424749 | 2008 | Journal of immunology (Baltimore, Md. : 1950) |
| Ms4a7   | 0 | 0         |      |                                     |
| Ms4a6d  | 0 | 0         |      |                                     |
| Rab32   | 0 | 0         |      |                                     |
| Il33    | 45| 23169007  | 2012 | European journal of immunology     |
| Il33    | 45| 22694930  | 2012 | The Journal of allergy and clinical immunology |
| Il33    | 45| 22574108  | 2012 | PloS one                            |
| Il33    | 45| 22562552  | 2012 | Applied biochemistry and biotechnology |
| Il33    | 45| 22540331  | 2012 | Allergy                             |
| Il33    | 45| 22349136  | 2012 | Inflammation research               |
| Il33    | 45| 22329990  | 2012 | The Journal of experimental medicine |
| Il33    | 45| 22307629  | 2012 | Proceedings of the National Academy of Sciences of the United States of America |
| Il33    | 45| 22233535  | 2012 | Clinical and experimental allergy   |
| Il33    | 45| 22215666  | 2012 | The Journal of biological chemistry  |
| Il33    | 45| 22112999  | 2012 | Current opinion in pulmonary medicine |
| Il33    | 45| 21804549  | 2011 | Nature genetics                     |
| Il33    | 45| 21802127  | 2011 | The Journal of allergy and clinical immunology |
| Il33    | 45| 21712394  | 2011 | Journal of leukocyte biology        |
| Il33    | 45| 21682745  | 2011 | Immunological reviews               |
| Il33    | 45| 21682736  | 2011 | Immunological reviews               |
| Il33    | 45| 21629437  | 2010 | Current genomics                    |
| Il33    | 45| 21519352  | 2011 | Nature reviews. Rheumatology        |
| Il33    | 45| 21301328  | 2011 | Current opinion in allergy and clinical immunology |
| Il33    | 45| 21276132  | 2011 | Respiratory (Carlton, Vic.)         |
| Il33    | 45| 21158975  | 2011 | Journal of internal medicine        |
| Il33    | 45| 21150435  | 2011 | Current opinion in allergy and clinical immunology |
| Il33    | 45| 21071194  | 2010 | Current opinion in immunology       |
| Il33    | 45| 20931364  | 2011 | Current allergy and asthma reports  |
| Il33    | 45| 20926795  | 2010 | Journal of immunology (Baltimore, Md. : 1950) |
| Il33    | 45| 20860503  | 2010 | The New England journal of medicine |
| Il33    | 45| 20816195  | 2010 | The Journal of allergy and clinical immunology |
| Il33    | 45| 20625511  | 2010 | PloS one                            |
| Il33    | 45| 20608085  | 2010 | the journal of the Japanese Respiratory Society |
| Gene | PubMed ID | Year | Journal |
|------|-----------|------|---------|
| II33 | 20200520  | 2010 | Nature  |
| II33 | 20153038  | 2010 | The Journal of allergy and clinical immunology |
| II33 | 20081870  | 2010 | Nature reviews. Immunology |
| II33 | 20014018  | 2010 | Inflammatory bowel diseases |
| II33 | 19906013  | 2010 | The Journal of allergy and clinical immunology |
| II33 | 19839663  | 2009 | Proceedings of the National Academy of Sciences of the United States of America |
| II33 | 19763788  | 2010 | Inflammation research |
| II33 | 1964280   | 2009 | The Journal of allergy and clinical immunology |
| II33 | 18802081  | 2008 | Journal of immunology (Baltimore, Md. : 1950) |
| II33 | 18539196  | 2008 | The Journal of allergy and clinical immunology |
| II33 | 17623648  | 2007 | The Journal of biological chemistry |
| Ch25h| 0         | 0    |         |
| Ifit3 | 0       | 0    |         |
| Ifg1 | 16973978  | 2006 | American journal of respiratory and critical care medicine |
| Vnn1 | 0         | 0    |         |
| Pon1 | 22738861  | 2012 | Metabolism: clinical and experimental |
| Pon1 | 19575027  | 2009 | Journal of human genetics |
| Pon1 | 19556304  | 2009 | International immunology |
| Pon1 | 16943596  | 2006 | Biological trace element research |
| Pon1 | 15210868  | 2004 | Molecular interventions |
| Snx10| 0         | 0    |         |
| Ifi30| 0         | 0    |         |
| Itgb2| 22157542  | 2012 | The Journal of nutrition |
| Itgb2| 22004287  | 2011 | Respiratory research |
| Itgb2| 21985360  | 2011 | Clinical and experimental immunology |
| Itgb2| 20413544  | 2010 | The European respiratory journal |
| Itgb2| 20351460  | 2010 | Journal of infection in developing countries |
| Itgb2| 19463772  | 2009 | Experimental hematology |
| Itgb2| 18771439  | 2009 | Immunology |
| Itgb2| 18760454  | 2008 | The Journal of allergy and clinical immunology |
| Itgb2| 18684982  | 2008 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgb2| 18653650  | 2008 | The European respiratory journal |
| Itgb2| 18504400  | 2008 | International archives of allergy and immunology |
| Itgb2| 18056392  | 2007 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgb2| 17379071  | 2007 | Experimental hematology |
| Itgb2| 17052676  | 2006 | International immunopharmacology |
| Itgb2 | 48 | 16798840 | 2006 | International immunology |
|-------|----|---------|------|--------------------------|
| Itgb2 | 48 | 16601351 | 2006 | International archives of allergy and immunology |
| Itgb2 | 48 | 16601240 | 2006 | American journal of respiratory cell and molecular biology |
| Itgb2 | 48 | 16393658 | 2006 | Environmental health perspectives |
| Itgb2 | 48 | 12877819 | 2003 | Pulmonary pharmacology & therapeutics |
| Itgb2 | 48 | 12760968 | 2003 | American journal of respiratory cell and molecular biology |
| Itgb2 | 48 | 11504695 | 2001 | American journal of physiology. Lung cellular and molecular physiology |
| Itgb2 | 48 | 10893047 | 2000 | Inflammation research |
| Itgb2 | 48 | 10706734 | 2000 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgb2 | 48 | 10453752 | 1998 | Physiological research / Academia Scientiarum Bohemoslovaca |
| Itgb2 | 48 | 10390902 | 1998 | American journal of respiratory cell and molecular biology |
| Itgb2 | 48 | 10229100 | 1998 | European journal of immunology |
| Itgb2 | 48 | 9860039 | 1998 | Annals of allergy, asthma & immunology |
| Itgb2 | 48 | 9766628 | 1998 | Journal of leukocyte biology |
| Itgb2 | 48 | 9758896 | 1998 | International archives of allergy and immunology |
| Itgb2 | 48 | 9730868 | 1998 | American journal of respiratory cell and molecular biology |
| Itgb2 | 48 | 9670977 | 1998 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgb2 | 48 | 9561931 | 1998 | Inflammation |
| Itgb2 | 48 | 9561930 | 1998 | Inflammation |
| Itgb2 | 48 | 9561923 | 1998 | Inflammation |
| Itgb2 | 48 | 9187566 | 1997 | Internal medicine (Tokyo, Japan) |
| Itgb2 | 48 | 9117017 | 1997 | American journal of respiratory and critical care medicine |
| Itgb2 | 48 | 8886838 | 1996 | Human gene therapy |
| Itgb2 | 48 | 8871058 | 1996 | The European respiratory journal. Supplement |
| Itgb2 | 48 | 7576691 | 1995 | American journal of respiratory cell and molecular biology |
| Itgb2 | 48 | 7812576 | 1995 | American journal of respiratory and critical care medicine |
| Itgb2 | 48 | 7596088 | 1995 | The Kurume medical journal |
| Itgb2 | 48 | 7829126 | 1994 | Immunology letters |
| Itgb2 | 48 | 1358975 | 1992 | Journal of immunology (Baltimore, Md. : 1950) |
| Itgb2 | 48 | 1353976 | 1992 | American journal of respiratory cell and molecular biology |
| Itgb2 | 48 | 1586739 | 1992 | Blood |
| Itgb2 | 48 | 1682072 | 1991 | Clinical and experimental immunology |
| Clec4a2 | 0 | 0 | 0 | |
| Clec4n | 0 | 0 | 0 | |
| C1ra | 0 | 0 | 0 | |
| C1rb | 0 | 0 | 0 | |
| B4galnt1 | 0 | 0 | 0 | |
| Capg | 0 | 0 | 0 | |
| Reg3g | 0 | 0 | 0 | |
**Supplementary Table 3.** Pubmed search of genes present in gene signature previously reported to be associated with COPD

| Gene Symbol | count | PMID       | Year | Journal                                                                 |
|-------------|-------|------------|------|-------------------------------------------------------------------------|
| Tgfbi       | 2     | 22617718   | 2012 | Epigenetics : official journal of the DNA Methylation Society           |
| Tgfbi       | 2     | 16710170   | 2006 | Molecular vision                                                        |
| Matn4       | 0     | 0          |      |                                                                         |
| Clec7a      | 0     | 0          |      |                                                                         |
| Olr1        | 1     | 21412277   | 2011 | Cell death & disease                                                   |
| Ctsz        | 0     | 0          |      |                                                                         |
| Mmp12       | 64    | 22952876   | 2012 | PloS one                                                               |
| Mmp12       | 64    | 22949406   | 2012 | Journal of cellular biochemistry                                       |
| Mmp12       | 64    | 22888638   | NA   | Molekuliarnaia biologia                                                |
| Mmp12       | 64    | 22773692   | 2012 | American journal of physiology. Lung cellular and molecular physiology |
| Mmp12       | 64    | 22305682   | 2012 | The Journal of allergy and clinical immunology                          |
| Mmp12       | 64    | 22209295   | 2011 | Current opinion in pulmonary medicine                                  |
| Mmp12       | 64    | 21960547   | 2012 | American journal of respiratory cell and molecular biology             |
| Mmp12       | 64    | 21784967   | 2011 | American journal of physiology. Lung cellular and molecular physiology |
| Mmp12       | 64    | 21778810   | 2011 | Allergology international : official journal of the Japanese Society of Allergology |
| Mmp12       | 64    | 21647421   | 2011 | PloS one                                                               |
| Mmp12       | 64    | 21524282   | 2011 | Respiratory research                                                   |
| Mmp12       | 64    | 21445523   | 2011 | Brazilian journal of medical and biological                             |
| Mmp12       | 64    | 21378275   | 2011 | Blood                                                                  |
| Mmp12       | 64    | 20920189   | 2010 | Respiratory research                                                   |
| Mmp12       | 64    | 20815658   | 2010 | Experimental lung research                                             |
| Mmp12       | 64    | 20546881   | 2010 | The Journal of allergy and clinical immunology                          |
| Mmp12       | 64    | 20395558   | 2010 | American journal of respiratory and critical care medicine              |
| Mmp12       | 64    | 20364456   | 2010 | The New England journal of medicine                                    |
| Mmp12       | 64    | 20357289   | 2010 | The New England journal of medicine                                    |
| Mmp12       | 64    | 20133923   | 2010 | American journal of respiratory and critical care medicine              |
| Mmp12       | 64    | 20074461   | NA   | International journal of immunopathology and pharmacology             |
| Mmp12       | 64    | 20018959   | 2009 | The New England journal of medicine                                    |
| Mmp12       | 64    | 19797132   | 2010 | The European respiratory                                              |
| Mmp12       | 64    | 19706765   | 2009 | Cancer research                                                        |
| Mmp12       | 64    | 19536155   | 2009 | Nature                                                                 |
| Mmp12       | 64    | 19293200   | 2009 | Therapeutic advances in respiratory disease                            |
| Mmp12       | 64    | 18619044   | 2008 | Genetika                                                               |
| Mmp12       | 64    | 18334288   | 2008 | Matrix biology : journal of the International Society for Matrix Biology |
| Mmp12       | 64    | 17601747   | 2007 | Protein expression and purification                                    |
| gene | ID | year | journal | title |
|------|----|------|---------|-------|
| Mmp12 | 64 | 2006 | Methods in enzymology | |
| Mmp12 | 64 | 2006 | Journal of immunology (Baltimore, Md.: 1950) | |
| Mmp12 | 64 | 2006 | Inhalation toxicology | |
| Mmp12 | 64 | 2005 | Zhonghua liu xing xue za zhi = Zhonghua liuxingbingxue zazhi | |
| Mmp12 | 64 | 2006 | American journal of physiology. Lung cellular and molecular physiology | |
| Mmp12 | 64 | 2006 | The Journal of biological chemistry | |
| Mmp12 | 64 | 2005 | Respiratory research | |
| Mmp12 | 64 | 2005 | Thorax | |
| Mmp12 | 64 | 2005 | American journal of respiratory and critical care medicine | |
| Mmp12 | 64 | 2005 | The Journal of biological chemistry | |
| Mmp12 | 64 | 2005 | Memórias do Instituto Oswaldo Cruz | |
| Mmp12 | 64 | 2005 | Biochemical and biophysical research communications | |
| Mmp12 | 64 | 2005 | Inflammation research | |
| Mmp12 | 64 | 2005 | Current opinion in pulmonary medicine | |
| Mmp12 | 64 | 2004 | Biochemical and biophysical research communications | |
| Mmp12 | 64 | 2003 | American journal of respiratory and critical care medicine | |
| Mmp12 | 64 | 2003 | American journal of respiratory and critical care medicine | |
| Mmp12 | 64 | 2003 | Nature | |
| Mmp12 | 64 | 2003 | Nature | |
| Mmp12 | 64 | 2003 | Archives of biochemistry and biophysics | |
| Mmp12 | 64 | 2002 | American journal of pharmacogenomics | |
| Mmp12 | 64 | 2002 | American journal of physiology. Lung cellular and molecular physiology | |
| Mmp12 | 64 | 2002 | Chest | |
| Mmp12 | 64 | 2002 | Human molecular genetics | |
| Mmp12 | 64 | 2001 | Journal of molecular biology | |
| Mmp12 | 64 | 2001 | Journal of molecular biology | |
| Mmp12 | 64 | 2001 | Protein expression and purification | |
| Mmp12 | 64 | 2001 | Novartis Foundation symposium | |
| Mmp12 | 64 | 2001 | American journal of physiology. Lung cellular and molecular physiology | |
| Mmp12 | 64 | 2000 | Proceedings of the Society for Experimental Biology and Medicine. | |
| Mmp12 | 64 | 2000 | Proceedings of the National Academy of Sciences of the United States of America | |
| Mmp12 | 64 | 1999 | Thrombosis and haemostasis | |
| Mmp12 | 64 | 1999 | Journal of immunology (Baltimore, Md.: 1950) | |
| Mmp12 | 64 | 1997 | American journal of respiratory and critical care medicine | |
| Mmp12 | 64 | 1987 | The American review of respiratory disease | |
| Per3 | 0 | 0 | | |
| Dab2 | 0 | 0 | | |
| Slc3a2 | 0 | 0 | | |
| Cyba | 1 | 2010 | Clinica chimica acta; international journal of clinical chemistry | |
| Fpr2 | 1 | 2012 | Proceedings of the National Academy of Sciences of the United States of America | |
| Ctsk | 3 | 2009 | Modern pathology | |
| Ctsk | 3 | 17227755 | 2007 | The Journal of biological chemistry |
|------|----|----------|------|-----------------------------------|
| Ctsk | 3 | 15161653 | 2004 | The American journal of pathology |
| Ctsk | 0 | 0 | NA | - |
| Dbp  | 23 | 21930252 | 2011 | Respiratory physiology & neurobiology |
| Dbp  | 23 | 21228423 | 2011 | Thorax |
| Dbp  | 23 | 19858350 | 2009 | Chronic respiratory disease |
| Dbp  | 23 | 19552093 | 2008 | Journal of the Indian Medical Association |
| Dbp  | 23 | 19386071 | 2009 | Respirology (Carlton, Vic.) |
| Dbp  | 23 | 19002085 | 2008 | PostĘęepy higieny i medycyny doÅwiadczalnej (Online) |
| Dbp  | 23 | 18797740 | 2008 | Jornal brasileiro de pneumologia |
| Dbp  | 23 | 18336764 | 2007 | Chinese journal of tuberculosis and respiratory diseases |
| Dbp  | 23 | 17568753 | 2007 | Journal of human hypertension |
| Dbp  | 23 | 17192130 | 2006 | American journal of cardiovascular drugs : drugs, devices, and other interventions |
| Dbp  | 23 | 16697362 | 2006 | Clinica chimica acta; international journal of clinical chemistry |
| Dbp  | 23 | 16637263 | NA | Molekuliarnaia biologiia |
| Dbp  | 23 | 16579403 | NA | Indian journal of physiology and pharmacology |
| Dbp  | 23 | 16117430 | 2005 | Klinicheskaia meditsina |
| Dbp  | 23 | 16078956 | 2005 | Journal of the American Geriatrics Society |
| Dbp  | 23 | 15245906 | 2004 | Trends in biotechnology |
| Dbp  | 23 | 11219471 | 2001 | Clinical therapeutics |
| Dbp  | 23 | 10759446 | 2000 | The European respiratory journal |
| Dbp  | 23 | 7841973 | 1994 | Monaldi archives for chest disease |
| Dbp  | 23 | 1402344 | 1992 | The Journal of the Kentucky Medical Association |
| Dbp  | 23 | 1616198 | 1992 | Anales espaÑoles de pediatría |
| Dbp  | 23 | 1982059 | 1990 | Cardiovascular drugs and therapy |
| Dbp  | 23 | 2879733 | 1986 | European journal of clinical pharmacology |
| Ctsb | 0 | 0 | NA | - |
| Laptm5 | 0 | 0 | NA | - |
| Cxcl2 | 24 | 22360706 | 2012 | Free radical research |
| Cxcl2 | 24 | 21961642 | 2011 | Journal of environmental science and health. |
| Cxcl2 | 24 | 20887783 | 2010 | Free radical biology & medicine |
| Cxcl2 | 24 | 20818377 | 2010 | Nature medicine |
| Cxcl2 | 24 | 19744573 | 2009 | Pulmonary pharmacology & therapeutics |
| Cxcl2 | 24 | 19293939 | 2009 | PloS one |
| Cxcl2 | 24 | 19254149 | 2009 | American journal of veterinary research |
| Cxcl2 | 24 | 19050257 | 2008 | Journal of immunology (Baltimore, Md. : 1950) |
| Cxcl2 | 24 | 19004925 | 2009 | The Journal of pharmacology and experimental therapeutics |
| Cxcl2 | 24 | 18310229 | 2008 | American journal of physiology. Lung cellular and molecular physiology |
| Cxcl2 | 24 | 18256171 | 2008 | The Journal of pharmacology and experimental therapeutics |
| Cxcl2 | 24 | 18052742 | 2007 | American journal of veterinary research |
| Cxcl2 | 24 | 18021431 | 2007 | Respiratory research |
| Cxcl2  | 24 | 18007984 | 2007 | Environmental health perspectives |
|--------|----|----------|------|-----------------------------------|
| Cxcl2  | 24 | 17766584 | 2007 | American journal of physiology. Lung cellular and molecular physiology |
| Cxcl2  | 24 | 17690174 | 2007 | American journal of physiology. Gastrointestinal and liver physiology |
| Cxcl2  | 24 | 16929007 | 2006 | Toxicological sciences : an official journal of the Society of Toxicology |
| Cxcl2  | 24 | 15833762 | 2005 | American journal of physiology. Lung cellular and molecular physiology |
| Cxcl2  | 24 | 15668323 | 2005 | American journal of respiratory cell and molecular biology |
| Cxcl2  | 24 | 15333327 | 2004 | American journal of respiratory cell and molecular biology |
| Cxcl2  | 24 | 12476359 | 2003 | Inhalation toxicology |
| Cxcl2  | 24 | 12359653 | 2002 | American journal of respiratory and critical care medicine |
| Cxcl2  | 24 | 11798689 | 1999 | Zhonghua nei ke za zhi [Chinese journal of internal medicine] |

| Cxcl2  | 24 | 9847020 | 1998 | Veterinary immunology and immunopathology |

| Saa3   | 0  | 0       |      |                                   |
| Tmem106a | 0 | 0       |      |                                   |
| Prkcd  | 0  | 0       |      |                                   |
| Clu    | 0  | 0       |      |                                   |
| Smpdl3b| 0  | 0       |      |                                   |
| Lair1  | 0  | 0       |      |                                   |
| Itih4  | 1  | 18618493| 2008 | Proteomics |
| Grn    | 0  | 0       |      |                                   |
| Tgfbr1 | 0  | 0       |      |                                   |
| Lrg1   | 0  | 0       |      |                                   |
| Cd1d1  | 0  | 0       |      |                                   |
| C3     | 57 | 22462235| 2011 | Journal of traditional Chinese medicine |
| C3     | 57 | 21846943| 2011 | Disease markers |
| C3     | 57 | 21813741| 2011 | Radiology |
| C3     | 57 | 21524765| 2011 | Medicina clÃ­nica |
| C3     | 57 | 21270401| 2011 | Journal of immunology (Baltimore, Md. : 1950) |
| C3     | 57 | 20144890| 2010 | Experimental neurology |
| C3     | 57 | 19922730| 2009 | Current rheumatology reports |
| C3     | 57 | 19684087| 2009 | Journal of immunology (Baltimore, Md. : 1950) |
| C3     | 57 | 19101763| NA     | Marine biotechnology (New York, N.Y.) |
| C3     | 57 | 18403672| 2008 | Chest |
| C3     | 57 | 17975205| 2008 | American journal of respiratory and critical care medicine |
| C3     | 57 | 17502296| NA     | Annales de biologie clinique |
| C3     | 57 | 17471436| 2007 | The Journal of infectious diseases |
| C3     | 57 | 17331971| 2007 | The European respiratory journal |
| C3     | 57 | 16966403| 2006 | Infection and immunity |
| C3     | 57 | 16711502| 2006 | Revista espaÃ±ola de anestesiologÃ­a y reanimaciÃ³n |
| C3     | 57 | 16574942| 2006 | American journal of respiratory cell and molecular biology |
| C3     | 57 | 16571611| 2006 | The European respiratory journal |
| C3     | 57 | 16512391| 2006 | Klinicheskaia meditsina |
| Source | PMID | Year | Title |
|--------|------|------|-------|
| C3     | 16113417 | 2004 | Proceedings of the American Thoracic Society |
| C3     | 15159749 | 2004 | Stomatologija |
| C3     | 14563253 | 2003 | Revista clínica españa |
| C3     | 12615868 | 2003 | The Journal of antimicrobial chemotherapy |
| C3     | 11606842 | 2001 | Investigative radiology |
| C3     | 11591733 | 2001 | Journal of immunology (Baltimore, Md.: 1950) |
| C3     | 11371519 | 2001 | Journal of bacteriology |
| C3     | 11045117 | 2000 | Presse médicale (Paris, France: 1983) |
| C3     | 10218320 | 1998 | Journal of the Indian Medical Association |
| C3     | 10189505 | 1999 | Acta neurochirurgica |
| C3     | 9266867  | 1997 | Chest |
| C3     | 9071161  | 1997 | Nihon Kyū bu Shikkan Gakkai zasshi |
| C3     | 8926173  | 1996 | Der Hautarzt |
| C3     | 8541823  | 1995 | Monaldi archives for chest disease |
| C3     | 7751050  | 1995 | The Indian journal of medical research |
| C3     | 7878554  | 1994 | Thorax |
| C3     | 8137654  | 1993 | Zhonghua nei ke za zhi (Chinese journal of internal medicine) |
| C3     | 1564151  | 1992 | Journal of the American Academy of Dermatology |
| C3     | 2228068  | 1990 | The Indian journal of medical research |
| C3     | 2129476  | 1990 | Archivos de investigación mèdica |
| C3     | 2196033  | 1990 | Archives of virology |
| C3     | 2784010  | 1989 | Stereotactic and functional neurosurgery |
| C3     | 3069024  | 1988 | Annales de dermatologie et de vénérologie |
| C3     | 3649280  | 1987 | Clinical immunology and immunopathology |
| C3     | 3454206  | 1987 | Acta paediatrica hungarica |
| C3     | 3702213  | 1986 | Kidney international |
| C3     | 2424179  | 1986 | VÄtreshni bolesti |
| C3     | 3875903  | 1985 | South African medical journal |
| C3     | 6208579  | 1985 | Revista clínica españa |
| C3     | 6978407  | 1982 | Journal of clinical & laboratory immunology |
| C3     | 7251858  | 1981 | The Journal of clinical investigation |
| C3     | 6911988  | 1981 | Acta medica Austriaca |
| C3     | 7202596  | 1980 | European journal of respiratory diseases |
| C3     | 7354236  | 1980 | The Journal of laboratory and clinical medicine |
| C3     | 112044   | 1979 | Immunology |
| C3     | 308809   | 1978 | British journal of diseases of the chest |
| C3     | 1004644  | 1976 | Naunyn-Schmiedeberg's archives of pharmacology |
| C3     | 806400   | 1975 | Clinical allergy |

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Emr1 0 0
| Seed | Source ID | Year | Journal Title |
|------|-----------|------|---------------|
| ACP2 | 22462235  | 2011 | Journal of traditional Chinese medicine |
| HAVCR2 | 21813741 | 2011 | Radiology |
| CFB | 19922730 | 2009 | Current rheumatology reports |
| C2 | 19716045 | 2009 | The Journal of heart and lung transplantation |
| C2 | 19651244 | 2009 | Respiratory physiology & neurobiology |
| C2 | 19136241 | 2009 | Respiratory medicine |
| C2 | 17804442 | 2008 | The European respiratory journal |
| C2 | 17384086 | 2007 | American journal of physiology. Lung cellular and molecular physiology |
| C2 | 17379851 | 2007 | American journal of respiratory and critical care medicine |
| C2 | 16102443 | 2005 | The Journal of heart and lung transplantation |
| C2 | 16008065 | 2005 | Clinical transplantation |
| C2 | 15171561 | 2004 | Zhongguo yi xue ke xue yuan xue bao. Acta Academiae Medicinae Sinicae |
| C2 | 12615868 | 2003 | The Journal of antimicrobial chemotherapy |
| C2 | 12561617 | 2001 | Wei sheng yan jiu = Journal of hygiene research |
| C2 | 12184862 | 2002 | Journal of aerosol medicine |
| C2 | 11964752 | 2002 | Current opinion in allergy and clinical immunology |
| C2 | 11561763 | 2001 | Virchows Archiv : an international journal of pathology |
| C2 | 10780759 | 2000 | The European respiratory journal |
| C2 | 9641386  | 1998 | The European journal of surgery. |
| C2 | 3565938  | 1987 | The American review of respiratory disease |
| C2 | 3773900  | 1986 | Monographs in allergy |
| C2 | 6836186  | 1983 | Research in veterinary science |
| C2 | 663425   | 1978 | Respiration; international review of thoracic diseases |
| Cp | 23132203 | 2012 | Medical care |
| Cp | 23000935 | 2012 | The American journal of geriatric psychiatry |
| Cp | 22726610 | 2012 | BMC pulmonery medicine |
| Cp | 21439045 | 2011 | Biomedical engineering online |
| Cp | 21340182 | NA   | Brazilian journal of otorhinolaryngology |
| Cp | 21211434 | 2010 | Chinese journal of stomatology |
| Cp | 21157643 | 2010 | Current opinion in investigational drugs (London, England : 2000) |
| Cp | 21110197 | 2011 | Heart and vessels |
| Cp | 21092098 | 2010 | Trials |
| Cp | 20536425 | 2010 | Current topics in medicinal chemistry |
| Cp | 20463253 | 2010 | Proceedings of the American Thoracic Society |
| Cp | 19998041 | 2010 | Lung |
| Cp  | 72 | 19995653 | 2009 | Revue de pneumologie clinique |
| Cp  | 72 | 19560768 | 2009 | Gastrointestinal endoscopy |
| Cp  | 72 | 19350630 | 2009 | International journal of cancer. Journal international du cancer |
| Cp  | 72 | 19058490 | NA   | Revista alergia Mexico (Tecamachalco, Puebla, Mexico : 1993) |
| Cp  | 72 | 19052510 | 2008 | ArerugÄ« = [Allergy] |
| Cp  | 72 | 18619824 | 2008 | Respiratory medicine |
| Cp  | 72 | 18441096 | 2008 | American journal of physiology. Lung cellular and molecular physiology |
| Cp  | 72 | 18188083 | 2008 | Journal of occupational and environmental medicine |
| Cp  | 72 | 18028276 | 2008 | Transfusion |
| Cp  | 72 | 17526197 | 2007 | Terapevticheskiârkhiv |
| Cp  | 72 | 17287299 | 2007 | Thorax |
| Cp  | 72 | 16495069 | 2006 | European journal of cardio-thoracic surgery |
| Cp  | 72 | 16249920 | 2006 | European journal of applied physiology |
| Cp  | 72 | 16249313 | 2005 | Physiological genomics |
| Cp  | 72 | 16236083 | 2005 | International journal of clinical practice |
| Cp  | 72 | 16222887 | NA   | The Journal of international medical research |
| Cp  | 72 | 16113464 | 2005 | Proceedings of the American Thoracic Society |
| Cp  | 72 | 15474975 | 2005 | The international journal of biochemistry & cell biology |
| Cp  | 72 | 15289103 | 2004 | Journal of molecular biology |
| Cp  | 72 | 14769726 | 2004 | Chest |
| Cp  | 72 | 14512671 | NA   | Respiration; international review of thoracic diseases |
| Cp  | 72 | 12740284 | 2003 | Chest |
| Cp  | 72 | 12504900 | 2003 | Archives of biochemistry and biophysics |
| Cp  | 72 | 12371533 | 2002 | Journal of investigational allergology & clinical immunology |
| Cp  | 72 | 12211408 | 2002 | Current opinion in investigational drugs (London, England : 2000) |
| Cp  | 72 | 11980276 | 2001 | Monaldi archives for chest disease |
| Cp  | 72 | 11798603 | 2001 | Zhonghua nei ke za zhi [Chinese journal of internal medicine] |
| Cp  | 72 | 11780351 | 2001 | Chinese medical journal |
| Cp  | 72 | 11171871 | 2001 | International journal of epidemiology |
| Cp  | 72 | 11075875 | 2000 | Cancer causes & control : CCC |
| Cp  | 72 | 10934068 | 2000 | American journal of respiratory and critical care medicine |
| Cp  | 72 | 10232436 | 1999 | The European respiratory journal |
| Cp  | 72 | 10193378 | 1998 | Thorax |
| Cp  | 72 | 9253724 | 1997 | Journal of occupational and environmental medicine |
| Cp  | 72 | 7593895 | 1995 | Intensive care medicine |
| Cp  | 72 | 7647736 | 1995 | Pneumonologia i alergologia polska |
| Cp  | 72 | 8005246 | 1994 | The European respiratory journal |
| Cp  | 72 | 8310540 | 1993 | La Tunisie mÄ©dicale |
| Cp  | 72 | 8368923 | 1993 | Archives of surgery (Chicago, Ill. : 1960) |
| Cp  | 72 | 8511687 | 1993 | South African medical journal |
| ID  | H2 | YR | Source                                                                 |
|-----|----|----|------------------------------------------------------------------------|
| Cp  | 72 | 1339048 | Cancer epidemiology, biomarkers & prevention                          |
| Cp  | 72 | 1585224 | South African medical journal                                          |
| Cp  | 72 | 1392658 | Polish journal of occupational medicine and environmental health      |
| Cp  | 72 | 1895584 | Nihon Kyoei Shikkan Gakkai zasshi                                    |
| Cp  | 72 | 2129991 | Chirurgie                                                              |
| Cp  | 72 | 2804252 | Biopharmaceutics & drug disposition                                    |
| Cp  | 72 | 2805949 | Zhonghua nei ke za zhi [Chinese journal of internal medicine]        |
| Cp  | 72 | 2919340 | South African medical journal                                          |
| Cp  | 72 | 3258445 | Journal of applied physiology (Bethesda, Md.: 1985)                   |
| Cp  | 72 | 3356633 | British journal of clinical pharmacology                              |
| Cp  | 72 | 4048084 | Preventive medicine                                                   |
| Cp  | 72 | 6508357 | Archives of environmental health                                       |
| Cp  | 72 | 6838047 | The American review of respiratory disease                            |
| Cp  | 72 | 6837720 | The American journal of pathology                                     |
| Cp  | 72 | 7065516 | The American review of respiratory disease                            |
| Cp  | 72 | 7330656 | Schweizerische medizinische Wochenschrift                             |
| Cp  | 72 | 760740  | British journal of clinical pharmacology                              |
| Ly6i| 0  | 22053820 | Journal of proteome research                                          |
| Pigr| 7  | 2151217 | American journal of respiratory and critical care medicine             |
| Pigr| 7  | 20706611 | Journal of biomedicine & biotechnology                                |
| Pigr| 7  | 12654638 | American journal of respiratory cell and molecular biology            |
| Pigr| 7  | 12615618 | American journal of respiratory and critical care medicine             |
| Pigr| 7  | 11208645 | American journal of respiratory and critical care medicine             |
| Pigr| 7  | 11082760 | Acta oto-rhino-laryngologica Belgica                                 |
| C1qb| 0  | 21569324 | BMC pulmonary medicine                                               |
| Bst1| 0  | 21474912 | Respiration; international review of thoracic diseases                |
| Muc1| 13 | 21206098 | JOP: Journal of the pancreas                                          |
| Muc1| 13 | 20886351 | International archives of occupational and environmental health       |
| Muc1| 13 | 20538446 | Respiratory medicine                                                  |
| Muc1| 13 | 19960788 | Sarcoidosis, vasculitis, and diffuse lung diseases                    |
| Muc1| 13 | 18595202 | Biomarkers: biochemical indicators of exposure, response, and susceptibility to chemicals |
| Muc1| 13 | 16969297 | Transplantation                                                       |
| Muc1| 13 | 12605318 | Clinical rheumatology                                                 |
| Muc1| 13 | 12010847 | Chest                                                                 |
| Muc1| 13 | 11015008 | Nephron                                                               |
| Muc1| 13 | 9685530  | Lung                                                                  |
| Gene   | Value | Publication Year | Journal Title                                    |
|--------|-------|------------------|-------------------------------------------------|
| Muc1   | 13    | 1995             | Tubercle and lung disease                       |
| Lgals3bp | 0     | 0                |                                                 |
| Hvcn1  | 0     | 0                |                                                 |
| Scl6a20a | 0     | 0                |                                                 |
| Orm1   | 0     | 0                |                                                 |
| Orm2   | 0     | 0                |                                                 |
| Bcl2a1d | 0     | 0                |                                                 |
| Bcl2a1a | 0     | 0                |                                                 |
| Bcl2a1b | 0     | 0                |                                                 |
| Csf2rb2 | 0     | 0                |                                                 |
| Tifa   | 0     | 0                |                                                 |
| Itgax  | 4     | 2006             | International archives of allergy and immunology |
| Itgax  | 4     | 2006             | Clinical and experimental immunology            |
| Itgax  | 4     | 2006             | American journal of respiratory cell and molecular biology |
| Il1rn  | 15    | 1996             | The European respiratory journal                |
| Il1rn  | 15    | 2006             | Oman medical journal                            |
| Il1rn  | 15    | 2006             | American journal of respiratory cell and molecular biology |
| Il1rn  | 15    | 2006             | PLoS one                                        |
| Il1rn  | 15    | 2006             | International journal of chronic obstructive pulmonary disease |
| Il1rn  | 15    | 2006             | The European respiratory journal                |
| Il1rn  | 15    | 2006             | Arthritis research & therapy                    |
| Il1rn  | 15    | 2006             | American journal of respiratory and critical care medicine |
| Il1rn  | 15    | 2006             | Journal of clinical immunology                  |
| Il1rn  | 15    | 2006             | Respiratory medicine                            |
| Il1rn  | 15    | 2006             | The Kaohsiung journal of medical sciences        |
| Il1rn  | 15    | 2006             | Molekuliarnaia biologiia                        |
| Il1rn  | 15    | 2005             | Biochemical and biophysical research communications |
| Il1rn  | 15    | 2003             | Zeitschrift für Rheumatologie                   |
| Il1rn  | 15    | 2002             | Mediators of inflammation                       |
| Il1rn  | 15    | 2000             | American journal of physiology. Lung cellular and molecular physiology |
| Chi3l1 | 7     | 2012             | Biochemical and biophysical research communications |
| Chi3l1 | 7     | 2012             | Respiration; international review of thoracic diseases |
| Chi3l1 | 7     | 2011             | PLoS one                                        |
| Chi3l1 | 7     | 2011             | PLoS one                                        |
| Chi3l1 | 7     | 2011             | American journal of respiratory cell and molecular biology |
| Chi3l1 | 7     | 2009             | American journal of respiratory cell and molecular biology |
| Chi3l1 | 7     | 2008             | Journal of immunology (Baltimore, Md. : 1950)   |
| Cd68   | 38    | 2012             | Cell biochemistry and biophysics                |
| Cd68   | 38    | 2012             | Chest                                           |
| Cd68   | 38    | 2012             | Proceedings of the National Academy of Sciences of the United States of America |
| Cd68   | 38    | 2011             | Respiratory research                            |
| Gene | Accession | Year | Title |
|------|-----------|------|-------|
| Cd68 | 38        | 2011 | Diagnostic cytopathology |
| Cd68 | 38        | 2010 | Mediators of inflammation |
| Cd68 | 38        | 2010 | Romanian journal of morphology and embryology |
| Cd68 | 38        | 2010 | American journal of physiology. Lung cellular and molecular physiology |
| Cd68 | 38        | 2009 | Thorax |
| Cd68 | 38        | 2008 | COPD |
| Cd68 | 38        | 2007 | International journal of chronic obstructive pulmonary disease |
| Cd68 | 38        | 2007 | Thorax |
| Cd68 | 38        | 2006 | The European respiratory journal |
| Cd68 | 38        | 2005 | Expert review of clinical immunology |
| Cd68 | 38        | 2005 | Pulmonary pharmacology & therapeutics |
| Cd68 | 38        | 2004 | Thorax |
| Cd68 | 38        | 2003 | American journal of respiratory and critical care medicine |
| Cd68 | 38        | 2003 | Thorax |
| Cd68 | 38        | 2002 | American journal of respiratory and critical care medicine |
| Cd68 | 38        | 2001 | Novartis Foundation symposium |
| Cd68 | 38        | 2000 | The Journal of allergy and clinical immunology |
| Cd68 | 38        | 2000 | Thorax |
| Cd68 | 38        | 2000 | Free radical biology & medicine |
| Cd68 | 38        | 2000 | Thorax |
| Cd68 | 38        | 1999 | Internal medicine (Tokyo, Japan) |
| Cd68 | 38        | 1998 | American journal of respiratory and critical care medicine |
| Cd68 | 38        | 1997 | The American journal of pathology |
| Cd68 | 38        | 1997 | American journal of respiratory and critical care medicine |
| Cd68 | 38        | 1996 | American journal of respiratory and critical care medicine |
| Gatm | 0         |      |       |
| Olfm1| 0         |      |       |
| Sirpa| 0         |      |       |
| Ptgs1| 6         | 2012 | Expert opinion on therapeutic targets |
| Ptgs1| 6         | 2012 | Immunobiology |
| Ptgs1| 6         | 2011 | Archivos de bronconeumologia |
| Ptgs1| 6         | 2011 | Prostaglandins & other lipid mediators |
| Lbp   | 10  | 20129855 | 2010 | IEEE transactions on medical imaging |
|-------|-----|----------|------|--------------------------------------|
| Lbp   | 10  | 19718433 | 2009 | PloS one                             |
| Lbp   | 10  | 19010986 | 2009 | The European respiratory journal     |
| Lbp   | 10  | 18979835 | 2008 | Medical image computing and computer-assisted intervention |
| Lbp   | 10  | 16740168 | 2006 | BMC pulmonary medicine               |
| Lbp   | 10  | 15356561 | 2004 | The Journal of allergy and clinical immunology |
| Lbp   | 10  | 11514694 | 2001 | Thorax                               |
| Lbp   | 10  | 10468134 | 1999 | The Journal of infection             |
| Lbp   | 10  | 9731007  | 1998 | American journal of respiratory and critical care medicine |
| Lbp   | 10  | 8795671  | 1996 | Thorax                               |
| Rab20 |     | 0        |      |                                      |
| F10   | 2   | 22970026 | 2012 | Experimental and therapeutic medicine |
| F10   | 2   | 18534165 | 2008 | Ugeskrift for laeger                |
| Naip2 |     | 0        |      |                                      |
| Cd14  | 31  | 23117214 | 2013 | Biomaterials                         |
| Cd14  | 31  | 22355383 | 2012 | PloS one                             |
| Cd14  | 31  | 21439805 | 2011 | Respiratory medicine                 |
| Cd14  | 31  | 21129004 | 2011 | Scandinavian journal of immunology   |
| Cd14  | 31  | 20709824 | 2011 | American journal of respiratory and critical care medicine |
| Cd14  | 31  | 20438701 | 2010 | Biochemical and biophysical research communications |
| Cd14  | 31  | 20080799 | 2010 | Proceedings of the National Academy of Sciences of the United States of America |
| Cd14  | 31  | 19675120 | 2010 | Innate immunity                      |
| Cd14  | 31  | 19361972 | 2009 | Respiratory medicine                 |
| Cd14  | 31  | 19119705 | 2008 | Annals of allergy, asthma & immunology |
| Cd14  | 31  | 19085563 | 2008 | Experimental lung research           |
| Cd14  | 31  | 19080469 | 2008 | Zhonghua yi xue za zhi               |
| Cd14  | 31  | 19010986 | 2009 | The European respiratory journal     |
| Cd14  | 31  | 18446588 | 2008 | The Journal of asthma : official journal of the Association for the Care of Asthma |
| Cd14  | 31  | 17574828 | 2007 | Respiratory medicine                 |
| Cd14  | 31  | 17384086 | 2007 | American journal of physiology. Lung cellular and molecular physiology |
| Cd14  | 31  | 17072032 | 2006 | Journal of physiology and pharmacology |
| Cd14  | 31  | 16907910 | 2006 | Clinical and experimental immunology |
| Cd14  | 31  | 16606450 | 2006 | Respiratory research                 |
| Cd14  | 31  | 16406722 | 2007 | Pulmonary pharmacology & therapeutics |
| Gene  | PubMed ID | Year | Journal or Article Name |
|-------|-----------|------|-------------------------|
| Cd14  | 31 16004610 2005 | Respiratory research |
| Cd14  | 31 15879152 2005 | Journal of immunology (Baltimore, Md. : 1950) |
| Cd14  | 31 15802338 2005 | The European respiratory journal : |
| Cd14  | 31 15660518 2005 | Annual review of medicine |
| Cd14  | 31 15544629 2004 | Clinical and experimental immunology |
| Cd14  | 31 15138625 2004 | International journal of molecular medicine |
| Cd14  | 31 12684293 2003 | Chest |
| Cd14  | 31 11440642 2001 | Journal of interferon & cytokine research |
| Cd14  | 31 10707942 2000 | Journal of medical microbiology |
| Cd14  | 31 8998075 1997 | American journal of respiratory cell and molecular biology |
| Cd200r1 | 0 0 | Cancer research |
| Mtm1  | 0 0 |  |
| Trf7  | 0 0 |  |
| Cybb  | 4 18952568 2009 | American journal of respiratory cell and molecular biology |
| Cybb  | 4 18403597 2008 | The American journal of pathology |
| Cybb  | 4 16123991 2006 | Pediatric blood & cancer |
| Cybb  | 4 15983040 2005 | The Journal of biological chemistry |
| Atp6ap2 | 0 0 |  |
| Id2   | 1 17395785 2007 | American journal of physiology. Regulatory, integrative and comparative physiology |
| Slc26a4 | 5 22116372 2011 | Cellular physiology and biochemistry |
| Slc26a4 | 5 22116359 2011 | Cellular physiology and biochemistry |
| Slc26a4 | 5 22116352 2011 | Cellular physiology and biochemistry |
| Slc26a4 | 5 21814192 2011 | Clinical pharmacology and therapeutics |
| Slc26a4 | 5 18424749 2008 | Journal of immunology (Baltimore, Md. : 1950) |
| Ms4a7  | 0 0 |  |
| Ms4a6d  | 0 0 |  |
| Rab32  | 0 0 |  |
| Il33   | 2 21682745 2011 | Immunological reviews |
| Il33   | 2 20608085 2010 | Nihon KokyÅ«ki Gakkai zasshi = the journal of the Japanese Respiratory Society |
| Ch25h  | 0 0 |  |
| Ifit3  | 0 0 |  |
| Igf1   | 0 0 |  |
| Vnn1   | 0 0 |  |
| Pon1   | 6 22738861 2012 | Metabolism: clinical and experimental |
| Pon1   | 6 22528954 2012 | Sleep & breathing = Schlaf & Atmung |
| Pon1   | 6 22015083 2011 | Respiratory medicine |
| Pon1   | 6 18635682 2008 | Journal of medical genetics |
| Pon1   | 6 17613085 2007 | Inhalation toxicology |
| Pon1   | 6 16380766 2005 | Saudi medical journal |
| Snx10  | 0 0 |  |
|    |    |    |    |    |
|----|----|----|----|----|
| Ifi30 | 0 | 0 |    |    |
| Itgb2 | 10 | 21976223 | 2011 | Clinical and vaccine immunology : CVI |
| Itgb2 | 10 | 21651795 | 2011 | Respiratory research |
| Itgb2 | 10 | 19574534 | 2010 | American journal of respiratory cell and molecular biology |
| Itgb2 | 10 | 17626109 | 2007 | The European respiratory journal |
| Itgb2 | 10 | 17573488 | 2007 | Chest |
| Itgb2 | 10 | 16807266 | 2006 | The European respiratory journal |
| Itgb2 | 10 | 11953106 | 2002 | Chinese journal of tuberculosis and respiratory diseases |
| Itgb2 | 10 | 11817553 | 2002 | Equine veterinary journal |
| Itgb2 | 10 | 10707942 | 2000 | Journal of medical microbiology |
| Itgb2 | 10 | 8902456 | 1996 | The European respiratory journal |
| Clec4a2 | 0 | 0 |    |    |
| Clec4n | 0 | 0 |    |    |
| C1ra | 0 | 0 |    |    |
| C1rb | 0 | 0 |    |    |
| B4galnt1 | 0 | 0 |    |    |
| Capg | 0 | 0 |    |    |
| Reg3g | 0 | 0 |    |    |
| Psap | 0 | 0 |    |    |
