

Original Article

Gene expression profile predicting the response to anti-TNF antibodies therapy in patients with inflammatory bowel disease: analyses of GEO datasets

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Abstract: Anti-tumor necrosis factor (anti-TNF) antibodies therapy is a new choice for patients with inflammatory bowel disease (IBD). However, not all patients show favorable response to anti-TNF therapy. Our aim of this study is to identify differentially expressed genes (DEGs) that could predict the response to anti-TNF antibodies therapy in IBD patients. We selected microarray datasets that examined response to anti-TNF therapy in IBD patients from the National Center for Biotechnology Information (NCBI) Gene Expression Omnibus (GEO). A meta-analysis of these datasets was performed using LIMMA package. Our analysis included 4 microarray datasets containing 56 responders and 50 non-responders. We identified 621 DEGs (adjusted P value <0.05), 23 up-regulated and 598 down-regulated. Among these DEGs, IL13RA2 had the lowest adjusted P value (adjusted $P=6.19E-08$). In addition, the DEGs were enriched in 78 GO terms. The GO term "response to wounding" had the lowest FDR value (FDR=1.00E-38). CXCR2, SELE, CXCL6, OSM, TNFAIP6, IL6, S100A8 and S100A9 were on the list of top 40 DEGs. Meanwhile, these genes were also enriched in the GO term "immune response" or "inflammatory response". Our findings provide a possibility of these genes play a role in predicting the response to anti-TNF therapy in IBD patients.

Keywords: Microarray datasets, anti-TNF, response, inflammatory bowel disease

Introduction

Inflammatory bowel disease (IBD) is an idiopathic, chronic, inflammatory disorders of the gastrointestinal tract [1]. Crohn's disease (CD) and ulcerative colitis (UC) are two major forms of IBD. CD and UC have many overlapping clinical and pathological features [2]. The pathogenesis of IBD is obscure. It depends upon an interaction of various factors such as immune response, inflammatory response, microbial infection, environmental factors and genetic factors [3-5]. The enhanced intestinal permeability and the altered luminal bacteria are of vital importance to the regulation of intestinal immune and inflammatory response [6, 7]. Traditional treatments targeting on inflammatory and immune response use drugs such as mesalamine, azathioprine and methylprednisolone [8-11]. In addition, tumor necrosis factor- α (TNF- α) is of vital importance in the pathogen-

esis of IBD [12]. Recently, some researches have found that many IBD patients have shown favorable response to the anti-TNF antibodies therapy [13].

Adalimumab and infliximab are two main anti-TNF agents that target to the pro-inflammatory cytokine TNF- α specially [14]. The mechanism of the anti-TNF antibodies is to block the binding between TNF- α and the cell surface receptors. In addition, anti-TNF antibodies limit the downstream cell signaling pathways as well [15]. In recent years, some randomized controlled trials have shown significant improvements in IBD patients treated with anti-TNF antibodies [16, 17]. However, some patients failed to achieve a favorable response to anti-TNF antibodies therapy [18]. The reason and mechanism of lacking response to anti-TNF therapy are not clarified.

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Microarray technology, a high-throughput genomic technology, can be used to identify predictive gene profiles in order to elucidate the complex networks and interactions in pathogenic processes and disease development [19]. Some researchers use the multiple gene microarray technology to identify gene expression profiles that can predict the response to anti-TNF α antibodies in IBD patients [20-22]. The genes identified by gene expression profiles can be helpful to find new biomarkers predicting the response to anti-TNF antibodies [23, 24]. This is of vital importance to optimal use of these agents. However, the lists of differentially expressed genes (DEGs) stored in different datasets are not consistent with each other. Meanwhile, the individual studies have other limitations, the random error could increase the likelihood of false-positive and false-negative associations.

Herein, an analysis to the publically available gene expression datasets was performed in our study to overcome the limitations [25, 26]. The purpose of our study was to identify the DEGs associated with the significant response to anti-TNF therapy in IBD patients. The use of microarray meta-analysis approach can enhance the statistical power of each dataset and generate a more reliable list of DEGs that can be predictive to the response to anti-TNF antibodies therapy. By using this method, we can also perform the gene ontology (GO) enrichment analysis to identify biological processes associated with response to anti-TNF antibodies therapy.

Materials and methods

Search strategy and data collection

We performed a search for microarray datasets that examined differentially expressed genes between responders and non-responders to anti-TNF therapy among patients with inflammatory bowel disease. Our investigators searched the NCBI Gene Expression Omnibus (GEO, <http://www.ncbi.nlm.nih.gov/geo/>) with the key words such as “anti-TNF”, “Infliximab”, “Adalimumab”, “inflammatory bowel disease”, “IBD”, “ulcerativecolitis”, “UC”, “Crohn Disease”, “CD” [27]. GEO datasets included in this analysis must meet the following inclusion criteria: (1) the samples were from human. (2) raw data of both responders and non-responders before

therapy at baseline were available. (3) all the datasets were publicly accessible. The following information of the eligible studies was extracted: (1) GEO accession, (2) platform, (3) sample type, (4) IBD type, (5) numbers of non-responders and responders. The exclusion criteria were as follows: (1) GEO datasets of subjects were other than IBD patients with anti-TNF α therapy, (2) the sample was not blood sample, (3) no English full text, (4) datasets with overlapping population.

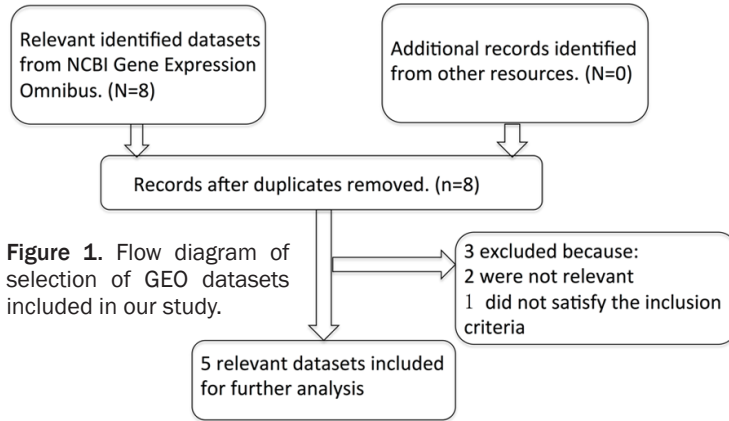
Data preprocessing

Five microarray datasets meeting the inclusion criteria were downloaded from NCBI GEO database. The Affy package in R language was used to transform the original data that was in CEL format into probe expression matrix [28]. According to the annotation information of the probes in platform GPL570, we converted the probe ID to gene symbol in the probe expression matrix. Robust Multichip Average (RMA) is an algorithm used to create an expression matrix from Affymetrix data. The raw intensity values are background corrected, log₂ transformed and then quantile normalized. Next a linear model is fit to the normalized data to obtain an expression [29]. Empirical Bayes method was used to eliminate the batch effect [30]. The above analysis was performed under the environment of R 3.1.1.

Meta-analysis of microarray datasets

We used MetaQC, an R package, for quality control (QC). MetaQC provided an objective and quantitative tool to help researchers to assess the quality of the GEO dataset for meta-analysis [31, 32]. The following six quantitative quality control (QC) measures were calculated with MetaQC: IQC (internal quality control), EQC (external quality control), AQC (AQCg and AQCp, accuracy quality control), CQC (CQCg and CQCp, consistency quality control). We calculated the mean rank of each QC measures among all of the datasets and used the ranks to assist visualization and decision. The LIMMA package (<http://bioconductor.org/packages/release/bioc/html/limma.html>) was used for selection of DEGs [33]. LIMMA package was a correct and popular method for gene selection through differential expression analyses of microarray. The fold change ≥ 1.5 and adjusted *P* value ≤ 0.01 were set to select the differentially

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expressed genes [34]. We performed the above analysis under the R 3.1.1 language environment. LIMMA uses linear models to analyze designed microarray experiments. Mathematically we assume a linear model $E[y_j] = X\alpha_j$ where y_j contains the expression data for the gene j , X is the design matrix and α_j is a vector of coefficients. Here y_j^T is the j th row of the expression matrix and contains either log-ratios or log-intensities. The contrasts of interest are given by $\beta_j = C^T\alpha_j$ where C is the contrasts matrix. The coefficients component of the fitted model produced by linear model fitness contains estimated values for the α_j . After applying contrasts fit, the coefficients component now contains estimated values for the β_j , which is used for ranking significantly up-/down-regulated genes [35].

Functional analysis

We got a differentially expressed gene list in the previous meta-analysis using the LIMMA package. In order to examine the biological processes associated with gene expression differences between responders and non-responders, we performed gene ontology (GO) enrichment analysis using the Database for Annotation, Visualization and Integrate Discovery (DAVID, <http://david.abcc.ncifcrf.gov/home.jsp>) [36]. We used the false discovery rate (FDR) value <0.05 as the threshold value [37].

Result

Characteristics of studies included in the analysis

Following an initial search, 8 microarray datasets were searched in the GEO. Two datasets

GSE472565 and GSE51785 were excluded from our analysis because they did not focus on the patients using anti-TNF α therapy. The dataset GSE42296 was excluded because it did not use mucous samples. Finally, we got 5 datasets for analysis including GSE12251, GSE14580, GSE23597, GSE16879 and GSE52746. The process of selecting eligible GEO datasets was shown in **Figure 1**. The main characteristics of all the included datasets were shown in **Table**

1. All these datasets included 57 non-responders and 60 responders in all. All these studies used mucous samples before anti-TNF therapy to identify gene expression profiles which can predict response to anti-TNF therapy. Infliximab and adalimumab were used in datasets GSE52746 and the other four datasets only used infliximab. All the expression profiles were based on the GPL570 platform Affymetrix Human Genome U133 Plus 2.0 Array. All the datasets included the gene expression profile of both responders and non-responders to anti-TNF therapy.

Data quality assessment

The MetaQC package described before was used to evaluate the quality of the selected GEO datasets. The mean rank score and were shown in **Table 2**. We excluded the dataset GSE52746 for its poor IQC score. This indicated it has an obviously heterogeneous co-expression structure with other datasets. According to the result of QC measures, we included the 4 following datasets in our meta-analysis: GSE12251, GSE14580, GSE16879 and GSE23597. There were 105 samples consisted of 55 responders and 50 non-responders included in our study finally.

Identifying differentially expressed genes between responders and non-responders

The meta-analysis was performed using LIMMA package in R language. And the adjusted P value ≤ 0.01 and the fold change ≥ 1.5 were used as a cut-off. We identified 621 DEGs between responders and non-responders finally. The list of DEGs was shown in **Table S1**. Among the 621 genes, 598 genes were down-

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Table 1. Summary information of the individual studies included in analysis

GEO dataset	IBD Type	Sample Type	Platform	Number	
				Responder	Non-responder
GSE23597	UC	Colonic mucous	GPL570 AffimetrixGeneChip Human Genome U133 Plus 2.0 array	15	6
GSE14580	UC	Colonic mucous	GPL570 AffimetrixGeneChip Human Genome U133 Plus 2.0 array	8	16
GSE12251	UC	Colonic mucous	GPL570 AffimetrixGeneChip Human Genome U133 Plus 2.0 array	12	11
GSE16879	CD	Colonic mucous	GPL570 AffimetrixGeneChip Human Genome U133 Plus 2.0 array	20	17
GSE52746	CD	Colonic mucous	GPL570 AffimetrixGeneChip Human Genome U133 Plus 2.0 array	5	7

UC: ulcerative colitis; CD: Crohn's disease.

Table 2. Result of quality assessment and mean rank score

Study	IQC	EQC	CQCg	CQCp	AQCg	AQCp	Rank
GSE16879	3.79	4	133.13	138.91	108.37	104.29	1.92
GSE14580	4.91	4	25.16	122.31	20.85	110.6	2.42
GSE12251	4.14	4	109.23	19.89	58.86	23.76	2.58
GSE23597	5.31	4	55.14	14.24	11.93	15.25	3.08
GSE52746	0.61*	2.8	1.06*	7.3	0.06*	1.37*	5

*Non-statistical significance and candidate of heterogeneous studies.

Table 3. The top 40 down-regulated genes between responders and non-responders

Probe ID	Gene symbol	logFC	adj. P. Val
206172_at	IL13RA2	-1.819638384	6.18565E-08
204933_s_at	TNFRSF11B	-1.355240769	1.56636E-07
206924_at	IL11	-2.109005719	2.00624E-07
207008_at	CXCR2	-1.82551843	3.73223E-07
1554997_a_at	PTGS2	-2.080994137	3.93442E-07
205119_s_at	FPR1	-1.509413427	4.20962E-07
204748_at	PTGS2	-2.103031858	4.50385E-07
204596_s_at	STC1	-0.930610563	5.41493E-07
213524_s_at	GOS2	-1.65587906	6.88435E-07
204959_at	MNDA	-1.869878414	7.25747E-07
206211_at	SELE	-1.841016184	7.25747E-07
206336_at	CXCL6	-1.831160744	7.25747E-07
209070_s_at	RGS5	-0.898591086	7.25747E-07
230170_at	OSM	-1.537996993	8.35312E-07
204932_at	TNFRSF11B	-1.35182162	8.35312E-07
227983_at	RILPL2	-0.636554312	8.35312E-07
224940_s_at	PAPPA	-0.97229895	8.50084E-07
219434_at	TREM1	-1.570458885	9.30982E-07
204597_x_at	STC1	-1.413418585	9.30982E-07
202422_s_at	ACSL4	-1.141738196	9.30982E-07
209278_s_at	TFPI2	-2.062621006	9.53918E-07
204006_s_at	FCGR3A	-1.685593642	9.53918E-07
204007_at	FCGR3B	-1.617098675	9.53918E-07
210119_at	KCNJ15	-1.602489504	9.53918E-07
210511_s_at	INHBA	-1.598454447	9.53918E-07
203561_at	FCGR2A	-1.286098001	9.53918E-07

regulated and another 23 genes were up-regulated. A list of the top 40 down-regulated genes was presented in **Table 3**. Among these down-regulated genes, IL13RA2 had the lowest adjusted *P* value (adjusted *P*=6.19E-08). A list of the top 20 up-regulated genes was shown in **Table 4**. Among these up-regulated genes, RETNLB had the lowest adjusted *P* value (adjusted *P*=0.005837). Heat map, based on DEGs found across the 4 datasets, was shown in **Figure 2**.

Functional analysis

We performed GO analysis of the DE genes using DAVID in order to identify the functional and biological processes associated with changes in gene expression between responders and non-responders with anti-TNF therapy. The GO term was selected when the FDR value <0.05. The DEGs were found to be enriched in 78 GO terms and the result was shown in **Table S2**. The top 10 significantly enriched GO terms were shown in **Table 5** and **Figure 3**. The most significantly enriched GO term was "response to wounding" and the FDR value was 1.00E-38. There were 85 genes being associated with this term. The second significantly enriched GO term was "immune response" (FDR=3.24E-38) with 95 genes associated with it. Other significantly enriched GO terms included "defense response" (FDR=1.78E-29), "inflammatory response" (FDR=2.27E-28), "chemo-

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210997_at	HGF	-1.054960262	9.53918E-07
224941_at	PAPPA	-0.951857096	9.54619E-07
206025_s_at	TNFAIP6	-1.869467406	1.06627E-06
205207_at	IL6	-1.733227029	1.06627E-06
214370_at	S100A8	-1.346236482	1.10693E-06
205922_at	VNN2	-1.311553163	1.10693E-06
205568_at	AQP9	-1.684820742	1.24237E-06
201859_at	SRGN	-0.725030622	1.2782E-06
238429_at	TMEM71	-1.080232483	1.37443E-06
227140_at	INHBA	-1.900745659	1.44055E-06
209949_at	NCF2	-1.226154349	1.48159E-06
204563_at	SELL	-1.398539673	1.50713E-06
219049_at	CSGALNACT1	-1.195367806	1.50713E-06
226001_at	KLHL5	-0.885365869	1.55466E-06

FC: fold change; adj. P. Val: adjusted *P* value.

Table 4. The top 20 up-regulated genes between responders and non-responders

Probe ID	Gene symbol	logFC	adj. P. Val
223551_at	PKIB	0.996853222	5.54328E-05
205259_at	NR3C2	0.598848417	0.000212939
213369_at	CDHR1	0.660518414	0.00022498
207080_s_at	PYY	1.108652968	0.000481853
214433_s_at	SELENBP1	0.728705472	0.000670964
212850_s_at	LRP4	0.695140324	0.000800902
226974_at	NEDD4L	0.627712379	0.000880678
213880_at	LGR5	0.689172765	0.001107014
220041_at	PIGZ	0.608676561	0.001232583
225457_s_at	LINC00263	0.630008704	0.00136159
229569_at	RP1-193H18.2	0.605968978	0.001536095
231120_x_at	PKIB	0.917293536	0.001630782
208121_s_at	PTPRO	0.673853448	0.001647192
213929_at	EXPH5	0.73558481	0.002105598
213435_at	SATB2	0.746730849	0.002709121
229831_at	CNTN3	0.765072391	0.003728518
232428_at	MOGAT2	0.638834642	0.003746119
224412_s_at	TRPM6	0.82747987	0.004045646
232054_at	PCDH20	0.984029996	0.004146952
223969_s_at	RETNLB	0.963086598	0.004456361

FC: fold change; adj. P. Val: adjusted *P* value.

taxix" (FDR=4.34E-15), "taxis" (FDR=4.34E-15), "cell adhesion" (FDR=6.66E-11).

Discussion

Compared to responders with anti-TNF antibodies, many genes are differentially expressed in non-responders [38]. There is a great need for us to identify an important group of genes that

can help us to make a better understanding of the biological process of response to anti-TNF antibodies therapy in IBD patients. Some researches use microarray technology to identify gene signatures that predict the response to anti-TNF antibodies [20-24]. However, the sample size of each dataset is small and the results of these datasets were not consistent with each other. So it is unreliable to identify the DEGs as biomarkers to predict the response to anti-TNF therapy. To overcome the limitations, we searched the NCBI GEO for microarray datasets predicting response to anti-TNF therapy in IBD patients [27]. We excluded the study using peripheral blood samples because blood cells were more sensitive to stress and the pattern of genes might be altered during the detection [23]. In order to get a more accurate result, we evaluated the quality of selected datasets. The GEO dataset with low IQC value was excluded from our analysis [31]. All the datasets were from the same platform GPL570. We performed a meta-analysis of these microarray datasets for more reliable identification of DEGs predicting response to anti-TNF therapy [39]. To our knowledge, a meta-analysis can increase the sample size leading to more accurate predictive power in research and this is the first meta-analysis of microarray datasets predicting response to anti-TNF antibodies therapy [25]. We analyzed 4 microarray datasets and identified 621 DEGs (23 up-regulated, 598 down-regulated) and the DEGs were found being enriched in 78 GO terms.

During the top 40 DEGs, IL13RA2, the interleukin 13-receptor alpha 2, had the lowest adjusted *P* value. The protein encoded by IL13RA2 could bind IL13 with high affinity. It played a role in the internalization of IL13 [40]. A study in mouse colitis model showed that enhancement of IL-13 activity would be beneficial in IBD patient and the IL13RA2 that acted as a decoy receptor could inhibit this protective affect [41].

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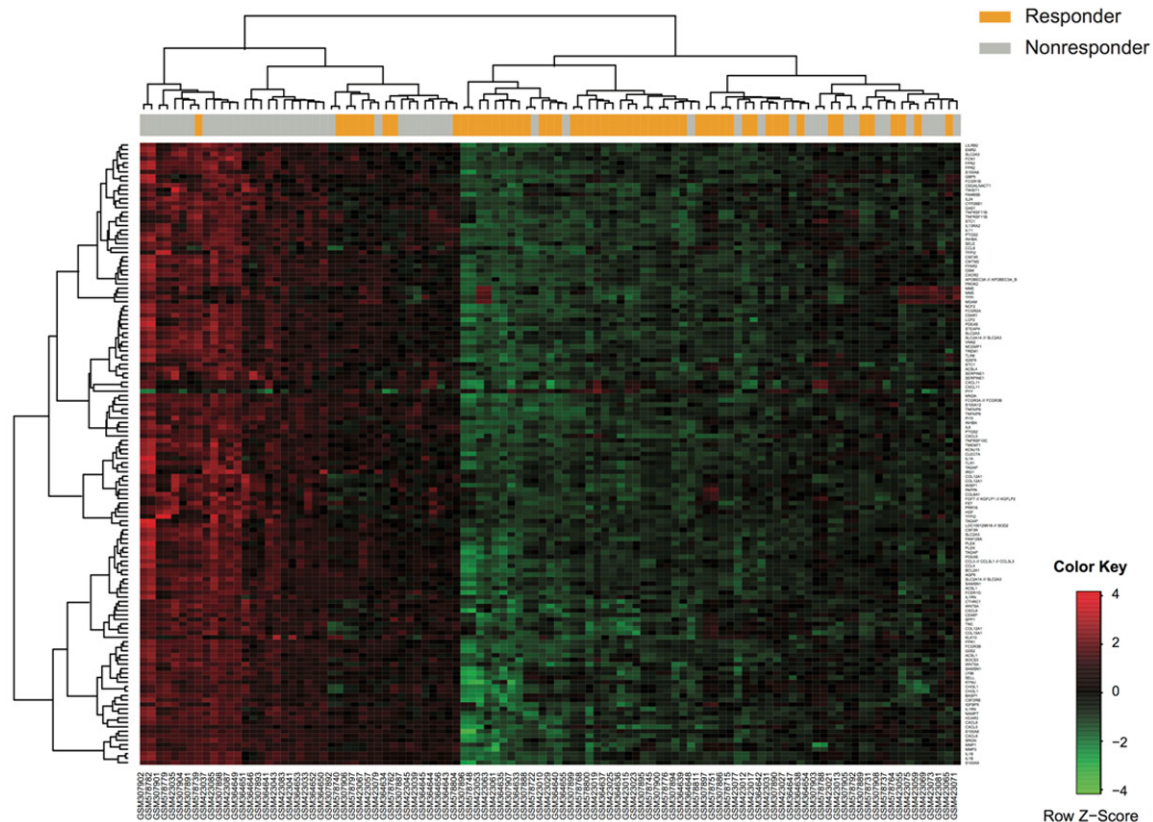


Figure 2. Hierarchical clustering analysis of the DEGs in responders vs. non-responders among patients with IBD.

Blocking the IL13RA2 could be seen as a potential therapy for IBD patients [41]. However, there were no more direct evidences could demonstrate the relation between IL13RA2 and response to anti-TNF therapy in IBD patients. Further studies were needed to prove the relations.

During the 78 GO terms, the most significantly enriched were “response to wounding”, “immune response”, “defense response”, inflammatory response”, “chemotaxis”, “taxis”, “cell adhesion”, “biological adhesion”. Biological process related to “immune response” and “inflammatory response” might be more relevant to the response to anti-TNF therapy [39]. CXCR2, SELE, CXCL6, OSM, TREM1, FCGR3A, FCGR3B, TNFAIP6, IL6, S100A8 and S100A9 were also on the list of top 40 DEGs. CXCR2, SELE, CXCL6, TNFAIP6, IL6, S100A8, S100A9 were enriched in the GO term “inflammatory response” while OSM, CXCL6, TREM1, FCGR3A, FCGR3B, IL6 were enriched in the GO term “immune response”.

TNFAIP6 was involved in extracellular matrix stability and cell migration [42]. Pro-inflammatory cytokines such as TNF- α could induce this gene [43]. CXCR2 mediated neutrophil migration to the sites of inflammation and it played an important role in the pathophysiology of many inflammatory diseases [44]. Some researchers reported that CXCR2 might represent a novel therapeutic strategy of inflammatory disease [45]. SELE played a role in the accumulation of blood leukocytes at site of inflammatory. DSS-induced colitis in mice showed increased expression of this gene [46]. Many studies had shown that IL6 was implicated in wide variety of inflammatory disease states [47, 48]. S100A8 and S100A9 were belonging to S100 family. The two genes might function in the inhibition of casein kinase. Some studies identified the two genes as susceptibility genes in IBD patients using the mucosal microarray method [49, 50]. FCGR3B could capture immune complexes in the peripheral circulation [51]. However, there were still no direct evidences to prove the relations between these DEGs and

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Table 5. Top 10 enriched GO term among DEGs in responders vs. non-responders

GO ID	Term	Count	FDR
GO:0009611	Response to wounding	85	1.00E-38
GO:0006955	Immune response	95	3.24E-38
GO:0006952	Defense response	80	1.78E-29
GO:0006954	Inflammatory response	59	2.27E-28
GO:0006935	Chemotaxis	32	4.34E-15
GO:0042330	Taxis	32	4.34E-15
GO:0007155	Cell adhesion	58	6.66E-11
GO:0022610	Biological adhesion	58	7.00E-11
GO:0042060	Wound healing	28	2.40E-09
GO:0007626	Locomotory behavior	33	3.91E-09

GO: gene ontology; FDR: false discovery rate.

Biological Process

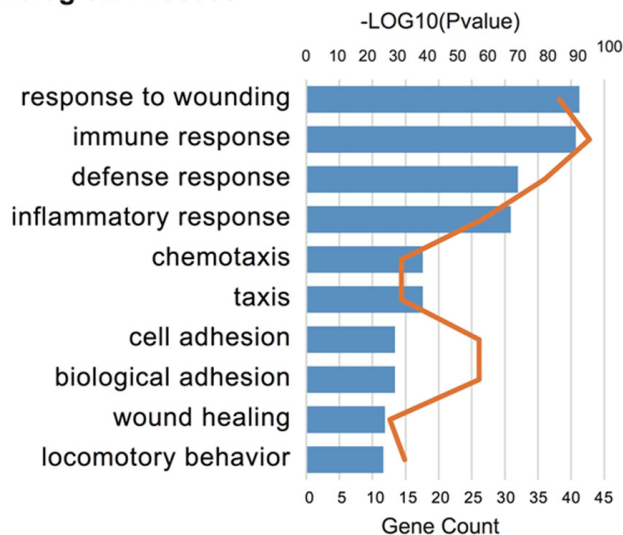


Figure 3. Summary of the enriched GO terms associated with the list of the DEGs in responders vs. non-responders among patients with IBD.

response to anti-TNF therapy in IBD patients. Further studies focusing on the relations between these genes and response to anti-TNF therapy in IBD patients were needed. Meanwhile, in order to find reliable biomarkers predicting the response to anti-TNF therapy, the mechanism of these genes regulating the response to anti-TNF therapy should be explained to some extent.

However, our present study had some limitations. Firstly, some clinical confounding factors such as gender, age of patients, severity of disease, dosages of drugs, could become source

of heterogeneity. Secondly, our study included two types of IBD, Crohn's disease and ulcerative colitis. We didn't do the subgroup analysis because the sample size was not big enough. Some interesting results might have been missed. Thirdly, there were only 4 microarray datasets contained 105 samples being included in our analysis. Studies with more samples were needed to confirm our results.

In conclusion, we performed the first meta-analysis of microarray datasets of response to anti-TNF antibodies therapy in patients with IBD. We identified 621 differentially expressed genes between responders and non-responders to anti-TNF antibodies therapy. Among these DEGs, 23 genes were up-regulated and 598 genes were down-regulated. Our study provided an overview of differentially expressed genes predicting favorable response to anti-TNF therapy. In order to find a reliable predictive biomarker, further studies were needed to explore the relations and mechanisms between the DEGs and IBD.

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Disclosure of conflict of interest

None.

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Table S1. The differentially expressed genes between responders and non-responders

Gene ID	Gene symbol	logFC	adj. P. Val
206172_at	IL13RA2	-1.819638384	6.18565E-08
204933_s_at	TNFRSF11B	-1.355240769	1.56636E-07
206924_at	IL11	-2.109005719	2.00624E-07
207008_at	CXCR2	-1.82551843	3.73223E-07
1554997_a_at	PTGS2	-2.080994137	3.93442E-07
205119_s_at	FPR1	-1.509413427	4.20962E-07
204748_at	PTGS2	-2.103031858	4.50385E-07
204596_s_at	STC1	-0.930610563	5.41493E-07
213524_s_at	GOS2	-1.65587906	6.88435E-07
204959_at	MNDA	-1.869878414	7.25747E-07
206211_at	SELE	-1.841016184	7.25747E-07
206336_at	CXCL6	-1.831160744	7.25747E-07
209070_s_at	RGS5	-0.898591086	7.25747E-07
230170_at	OSM	-1.537996993	8.35312E-07
204932_at	TNFRSF11B	-1.35182162	8.35312E-07
227983_at	RILPL2	-0.636554312	8.35312E-07
224940_s_at	PAPPA	-0.97229895	8.50084E-07
219434_at	TREM1	-1.570458885	9.30982E-07
204597_x_at	STC1	-1.413418585	9.30982E-07
202422_s_at	ACSL4	-1.141738196	9.30982E-07
209278_s_at	TFPI2	-2.062621006	9.53918E-07
204006_s_at	FCGR3A	-1.685593642	9.53918E-07
204007_at	FCGR3B	-1.617098675	9.53918E-07
210119_at	KCNJ15	-1.602489504	9.53918E-07
210511_s_at	INHBA	-1.598454447	9.53918E-07
203561_at	FCGR2A	-1.286098001	9.53918E-07
210997_at	HGF	-1.054960262	9.53918E-07
224941_at	PAPPA	-0.951857096	9.54619E-07
206025_s_at	TNFAIP6	-1.869467406	1.06627E-06
205207_at	IL6	-1.733227029	1.06627E-06
214370_at	S100A8	-1.346236482	1.10693E-06
205922_at	VNN2	-1.311553163	1.10693E-06
205568_at	AQP9	-1.684820742	1.24237E-06
201859_at	SRGN	-0.725030622	1.2782E-06
238429_at	TMEM71	-1.080232483	1.37443E-06
227140_at	INHBA	-1.900745659	1.44055E-06
209949_at	NCF2	-1.226154349	1.48159E-06
204563_at	SELL	-1.398539673	1.50713E-06
219049_at	CSGALNACT1	-1.195367806	1.50713E-06
226001_at	KLHL5	-0.885365869	1.55466E-06
202627_s_at	SERPINE1	-1.121312322	1.65861E-06
204595_s_at	STC1	-1.185842422	1.67258E-06
203535_at	S100A9	-1.537404937	1.75331E-06
206569_at	IL24	-1.459417476	1.75331E-06
201858_s_at	SRGN	-1.162216061	1.75331E-06
205990_s_at	WNT5A	-1.191640681	2.19641E-06
202628_s_at	SERPINE1	-1.200518642	2.44512E-06
1555725_a_at	RGS5	-0.896121386	2.44512E-06

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217967_s_at	FAM129A	-1.106627809	2.51526E-06
220088_at	C5AR1	-1.252054159	2.56794E-06
210176_at	TLR1	-1.164725318	2.56794E-06
229723_at	TAGAP	-1.471018264	2.61036E-06
210664_s_at	TFPI	-1.049393785	2.61036E-06
204924_at	TLR2	-0.980808736	2.61036E-06
203887_s_at	THBD	-0.930456356	2.61036E-06
210367_s_at	PTGES	-0.853716679	2.61036E-06
229967_at	CMTM2	-1.130127746	2.67758E-06
210772_at	FPR2	-1.422151985	2.75325E-06
209960_at	HGF	-0.879812365	2.92053E-06
207266_x_at	RBMS1	-0.716515263	2.92053E-06
202499_s_at	SLC2A3	-1.42314913	3.31489E-06
1555756_a_at	CLEC7A	-1.350435196	3.31489E-06
232629_at	PROK2	-1.986532265	3.36651E-06
222088_s_at	SLC2A14	-1.196380043	3.37672E-06
217966_s_at	FAM129A	-0.953265501	3.37672E-06
204714_s_at	F5	-0.90079774	3.37672E-06
207442_at	CSF3	-0.876605843	3.37672E-06
203065_s_at	CAV1	-0.838410579	3.37672E-06
208981_at	PECAM1	-0.779188252	3.37672E-06
222877_at	NRP2	-0.604104452	3.37672E-06
219825_at	CYP26B1	-1.340876411	3.4149E-06
209868_s_at	RBMS1	-0.843022433	3.44313E-06
207857_at	LILRA2	-0.964991635	3.49991E-06
226237_at	COL8A1	-1.365353284	3.64344E-06
210146_x_at	LILRB2	-1.363088082	3.64344E-06
1553297_a_at	CSF3R	-1.068367696	3.64344E-06
207697_x_at	LILRB2	-0.80949794	3.64344E-06
225681_at	CTHRC1	-1.434756766	3.66369E-06
203591_s_at	CSF3R	-1.312320519	3.69623E-06
211506_s_at	CXCL8	-1.982153846	3.95846E-06
209071_s_at	RGS5	-0.896327086	3.95846E-06
202897_at	SIRPA	-0.728808049	3.95846E-06
205067_at	IL1B	-1.516148022	4.09551E-06
39402_at	IL1B	-1.456614934	4.1508E-06
208092_s_at	FAM49A	-0.83078913	4.1508E-06
205220_at	HCAR3	-2.094425959	4.18238E-06
207610_s_at	EMR2	-1.081924623	4.18238E-06
224942_at	PAPPA	-0.684397485	4.18238E-06
206026_s_at	TNFAIP6	-1.885821384	4.21891E-06
212942_s_at	CEMIP	-1.539828133	4.21891E-06
213131_at	OLFM1	-0.974625361	4.21891E-06
212561_at	DENND5A	-0.739583436	4.21891E-06
202877_s_at	CD93	-0.700135661	4.21891E-06
203424_s_at	IGFBP5	-0.926268747	4.26492E-06
210873_x_at	APOBEC3A	-1.591186616	4.31445E-06
227565_at	KLHL5	-0.711482418	4.45681E-06
205159_at	CSF2RB	-1.089071557	4.52399E-06
204994_at	MX2	-0.813192825	4.52399E-06

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202878_s_at	CD93	-0.927572394	4.59974E-06
209732_at	CLEC2B	-0.794050734	4.76718E-06
223809_at	RGS18	-0.952864305	4.86768E-06
220014_at	PRR16	-1.006916718	5.07171E-06
221698_s_at	CLEC7A	-0.887627509	5.07643E-06
203140_at	BCL6	-0.951806641	5.07661E-06
203508_at	TNFRSF1B	-0.672316814	5.12076E-06
207574_s_at	GADD45B	-0.776904529	5.46332E-06
202497_x_at	SLC2A3	-1.080119146	5.47582E-06
212119_at	RHOQ	-0.638210022	5.47582E-06
209304_x_at	GADD45B	-0.594966117	5.47582E-06
201645_at	TNC	-1.477024556	5.61378E-06
229404_at	TWIST2	-0.872497132	5.61378E-06
209933_s_at	CD300A	-0.642566672	5.72545E-06
201809_s_at	ENG	-0.61368842	5.72545E-06
202859_x_at	CXCL8	-1.606137149	5.76501E-06
204105_s_at	NRCAM	-0.955147795	5.76501E-06
206049_at	SELP	-0.839387294	5.76501E-06
213425_at	WNT5A	-1.167311677	5.77292E-06
205681_at	BCL2A1	-1.618545588	6.08856E-06
202498_s_at	SLC2A3	-1.145959286	6.08856E-06
231766_s_at	COL12A1	-1.304903343	6.73627E-06
205237_at	FCN1	-1.159628018	6.76929E-06
202388_at	RGS2	-0.975017149	6.90996E-06
212624_s_at	CHN1	-0.828340659	7.20272E-06
234985_at	LDLRAD3	-0.680448515	7.20272E-06
229584_at	LRRK2	-0.92750443	7.41621E-06
225946_at	RASSF8	-0.762034109	7.41621E-06
204457_s_at	GAS1	-1.858541279	7.76585E-06
214974_x_at	CXCL5	-2.0468985	8.13926E-06
226847_at	FST	-1.089125062	8.25475E-06
208438_s_at	FGR	-0.882675979	8.25971E-06
203748_x_at	RBMS1	-0.673753635	8.25971E-06
224909_s_at	PREX1	-0.750966063	8.61943E-06
213004_at	ANGPTL2	-0.653421589	8.61943E-06
238063_at	TMEM154	-0.770646486	8.64073E-06
206953_s_at	LPHN2	-0.86680521	8.69792E-06
204174_at	ALOX5AP	-0.878507259	8.77255E-06
202917_s_at	S100A8	-1.831646595	8.84096E-06
205100_at	GFPT2	-0.673060468	8.84096E-06
222934_s_at	CLEC4E	-0.961140127	8.98846E-06
209683_at	FAM49A	-0.879226183	8.99045E-06
205863_at	S100A12	-1.967645974	9.04506E-06
202391_at	BASP1	-1.115000806	9.05435E-06
210992_x_at	FCGR2C	-0.803495398	9.05435E-06
203708_at	PDE4B	-1.148399077	9.07852E-06
231779_at	IRAK2	-0.685927152	9.57317E-06
1554676_at	SRGN	-0.873136016	9.98317E-06
212501_at	CEBPB	-0.631390347	9.98317E-06
213418_at	HSPA6	-0.955658987	1.00419E-05

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242388_x_at	TAGAP	-1.004363464	1.00893E-05
212657_s_at	IL1RN	-1.344173458	1.01233E-05
211302_s_at	PDE4B	-1.103556707	1.03619E-05
228128_x_at	PAPPA	-1.055385845	1.05577E-05
229947_at	PI15	-2.197785631	1.07856E-05
201389_at	ITGA5	-0.66745973	1.07856E-05
221345_at	FFAR2	-1.330375278	1.0806E-05
212950_at	GPR116	-0.839658563	1.0806E-05
206584_at	LY96	-1.033350968	1.09876E-05
206707_x_at	FAM65B	-0.778505603	1.11499E-05
232224_at	MASP1	-0.960510357	1.1183E-05
212097_at	CAV1	-0.776470538	1.1183E-05
213010_at	PRKCDBP	-0.674404734	1.14595E-05
215101_s_at	CXCL5	-2.065317328	1.17658E-05
203471_s_at	PLEK	-1.344479796	1.26134E-05
207072_at	IL18RAP	-0.941994444	1.26134E-05
1555643_s_at	LILRA5	-0.793620337	1.31903E-05
210773_s_at	FPR2	-1.21508652	1.37926E-05
205931_s_at	CREB5	-0.705477699	1.37926E-05
225987_at	STEAP4	-1.13179627	1.3948E-05
209821_at	IL33	-0.821049057	1.3948E-05
211959_at	IGFBP5	-1.068693546	1.41461E-05
225265_at	RBMS1	-0.71423353	1.42465E-05
214511_x_at	FCGR1B	-1.072292749	1.45898E-05
204222_s_at	GLIPR1	-0.832569773	1.47286E-05
215127_s_at	RBMS1	-0.697612676	1.5423E-05
219634_at	CHST11	-0.645403875	1.58683E-05
208018_s_at	HCK	-0.939464664	1.59881E-05
218854_at	DSE	-0.868719035	1.59881E-05
215813_s_at	PTGS1	-0.800675042	1.59881E-05
205114_s_at	CCL3	-1.564625892	1.61983E-05
208983_s_at	PECAM1	-0.807306172	1.61983E-05
207571_x_at	THEMIS2	-0.783840272	1.6265E-05
205619_s_at	MEOX1	-0.736362233	1.64328E-05
1552542_s_at	TAGAP	-0.917906265	1.66146E-05
214449_s_at	RHOQ	-0.686848507	1.66146E-05
209906_at	C3AR1	-0.67598237	1.66146E-05
206359_at	SOCS3	-0.815367584	1.68557E-05
206420_at	IGSF6	-1.007720239	1.69008E-05
220005_at	P2RY13	-0.94998004	1.69008E-05
219454_at	EGFL6	-0.917622767	1.73173E-05
222218_s_at	PILRA	-0.655554895	1.76317E-05
211163_s_at	TNFRSF10C	-1.012915012	1.77565E-05
208982_at	PECAM1	-0.781245984	1.77565E-05
1555638_a_at	SAMSN1	-1.0590031	1.7898E-05
220122_at	MCTP1	-0.910878192	1.84189E-05
214467_at	GPR65	-0.862090462	1.88135E-05
211564_s_at	PDLIM4	-0.673057709	1.90094E-05
203066_at	CHST15	-0.785205564	1.96097E-05
222939_s_at	SLC16A10	-0.779793358	1.96113E-05

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203760_s_at	SLA	-0.599431378	2.02203E-05
204103_at	CCL4	-1.164943069	2.02411E-05
1554899_s_at	FCER1G	-1.045239385	2.02411E-05
229934_at	mir-223	-0.872799783	2.09087E-05
212012_at	PXDN	-0.721041576	2.09087E-05
201506_at	TGFBI	-0.679032899	2.09413E-05
205828_at	MMP3	-1.541047117	2.11149E-05
216236_s_at	SLC2A14	-1.081160063	2.11481E-05
210423_s_at	SLC11A1	-0.89285822	2.12176E-05
210629_x_at	LST1	-0.677466534	2.16458E-05
243296_at	NAMPT	-1.344045756	2.16486E-05
204879_at	PDPN	-0.618995825	2.17239E-05
202238_s_at	NNMT	-0.904187612	2.27004E-05
205098_at	CCR1	-0.938320747	2.27589E-05
211981_at	COL4A1	-0.850253567	2.29721E-05
205798_at	IL7R	-0.843873947	2.30475E-05
235821_at	WISP1	-0.89675719	2.31434E-05
204232_at	FCER1G	-0.855582065	2.33585E-05
211395_x_at	FCGR2C	-0.831145372	2.35475E-05
229622_at	FAM132B	-0.704327238	2.39193E-05
209277_at	TFPI2	-1.277545237	2.50415E-05
205591_at	OLFM1	-0.656523936	2.50415E-05
226322_at	TMTC1	-0.619101628	2.50443E-05
209695_at	PTP4A3	-0.703559504	2.59271E-05
229802_at	WISP1	-1.220784467	2.59781E-05
231879_at	COL12A1	-1.058630733	2.7432E-05
236361_at	GALNT15	-0.673388042	2.7432E-05
203729_at	EMP3	-0.703951089	2.77572E-05
215078_at	SOD2	-1.351451938	2.78086E-05
229625_at	GBP5	-0.999496665	2.89661E-05
205270_s_at	LCP2	-0.943084837	2.89661E-05
218404_at	SNX10	-0.799759217	2.89661E-05
205352_at	SERPINI1	-0.602114363	2.89661E-05
212659_s_at	IL1RN	-0.984677354	2.95089E-05
238581_at	GBP5	-1.186275578	2.98851E-05
213733_at	MYO1F	-0.701451719	3.02585E-05
206796_at	WISP1	-0.730508452	3.14999E-05
202291_s_at	MGP	-0.963355612	3.18687E-05
201272_at	AKR1B1	-0.745103225	3.28395E-05
225664_at	COL12A1	-1.379945673	3.28593E-05
215223_s_at	SOD2	-0.904982969	3.28593E-05
213943_at	TWIST1	-1.003615876	3.29459E-05
206222_at	TNFRSF10C	-0.732232558	3.40189E-05
209955_s_at	FAP	-0.853698049	3.474E-05
214637_at	OSM	-0.738822127	3.474E-05
206331_at	CALCRL	-0.711038615	3.48264E-05
214181_x_at	LST1	-0.680115964	3.56213E-05
230748_at	SLC16A6	-0.865013304	3.60139E-05
202637_s_at	ICAM1	-0.725466715	3.85939E-05
234050_at	TAGAP	-1.00188306	3.90002E-05

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226621_at	OSMR	-0.796465377	3.90002E-05
238669_at	PTGS1	-0.696893782	3.90002E-05
220404_at	GPR97	-0.664290037	3.90002E-05
223767_at	GPR84	-0.980667307	3.93127E-05
229824_at	SHC3	-0.603188411	4.03741E-05
202237_at	NNMT	-0.904536665	4.10296E-05
229228_at	CREB5	-0.785486998	4.10296E-05
226834_at	CLMP	-0.900702108	4.10668E-05
207275_s_at	ACSL1	-1.089354076	4.10772E-05
212013_at	PXDN	-0.685405068	4.10772E-05
235670_at	STX11	-0.665309837	4.10772E-05
202052_s_at	RAI14	-0.660030556	4.20456E-05
203324_s_at	CAV2	-0.700401895	4.24489E-05
209930_s_at	NFE2	-0.88304554	4.56779E-05
219947_at	CLEC4A	-0.945647141	4.61398E-05
209875_s_at	SPP1	-1.461188171	4.69952E-05
201963_at	ACSL1	-1.081493473	4.69952E-05
226136_at	GLIPR1	-0.668935675	4.7089E-05
209606_at	CYTIP	-0.824888298	4.78913E-05
203186_s_at	S100A4	-0.717291225	4.80824E-05
215633_x_at	LST1	-0.652877614	4.80824E-05
209829_at	FAM65B	-1.07715045	4.85074E-05
211582_x_at	LST1	-0.634849378	4.90778E-05
220330_s_at	SAMSN1	-1.035337246	5.0326E-05
240287_at	IRG1	-1.162934287	5.20738E-05
204122_at	TYROBP	-0.744295804	5.54328E-05
208335_s_at	ACKR1	-0.669731622	5.71897E-05
206881_s_at	LILRA3	-0.659887545	5.72618E-05
205099_s_at	CCR1	-0.887903767	5.78412E-05
205118_at	FPR1	-0.671769721	5.78412E-05
219584_at	PLA1A	-0.705228984	5.91219E-05
209396_s_at	CHI3L1	-1.459744034	6.04331E-05
224341_x_at	TLR4	-0.777822854	6.04331E-05
228758_at	BCL6	-0.864031291	6.08908E-05
232068_s_at	TLR4	-0.799544998	6.12956E-05
211964_at	COL4A2	-0.65788027	6.15566E-05
201743_at	CD14	-0.75578738	6.22661E-05
205404_at	HSD11B1	-0.896596862	6.26606E-05
220066_at	NOD2	-0.589891913	6.26813E-05
230261_at	ST8SIA4	-0.751410563	6.30149E-05
214247_s_at	DKK3	-0.720826329	6.30149E-05
201811_x_at	SH3BP5	-0.607999862	6.30149E-05
205269_at	LCP2	-1.027765057	6.33614E-05
205128_x_at	PTGS1	-0.658436032	6.65134E-05
217764_s_at	RAB31	-0.672875156	6.68574E-05
227697_at	SOCS3	-1.101100446	6.69788E-05
232297_at	KLHL5	-0.743402006	6.69788E-05
210895_s_at	CD86	-0.719176228	6.81607E-05
1552798_a_at	TLR4	-0.598842216	6.85959E-05
217763_s_at	RAB31	-0.678208223	6.86104E-05

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204136_at	COL7A1	-0.864072905	6.86637E-05
209395_at	CHI3L1	-1.496631778	6.91147E-05
219183_s_at	CYTH4	-0.625477286	6.91147E-05
229560_at	TLR8	-1.099689413	6.97259E-05
210484_s_at	TNFRSF10C	-0.61561988	6.97259E-05
205083_at	AOX1	-0.747044714	7.08224E-05
203477_at	COL15A1	-1.00622282	7.21347E-05
228153_at	RNF144B	-0.697020291	7.25993E-05
221898_at	PDPN	-0.763243009	7.45755E-05
222235_s_at	CSGALNACT2	-0.713064528	7.67571E-05
211340_s_at	MCAM	-0.601459221	7.67839E-05
218181_s_at	MAP4K4	-0.592853315	7.83113E-05
221477_s_at	SOD2	-0.644849867	8.05424E-05
203470_s_at	PLEK	-1.002817777	8.13127E-05
212120_at	RHOQ	-0.610216695	8.21068E-05
210785_s_at	THEMIS2	-0.776786824	8.2919E-05
217590_s_at	TRPA1	-0.614184034	8.2919E-05
235740_at	MCTP1	-0.766430594	8.43929E-05
218723_s_at	RGCC	-0.702898869	8.59358E-05
1552773_at	CLEC4D	-0.622820403	9.24159E-05
207075_at	NLRP3	-0.738669631	9.29179E-05
235568_at	MCEMP1	-1.009525685	9.32908E-05
242943_at	ST8SIA4	-0.670533385	9.43965E-05
217762_s_at	RAB31	-0.702593221	9.52642E-05
226743_at	SLFN11	-0.60828183	9.62189E-05
211958_at	IGFBP5	-0.781620084	9.62882E-05
204422_s_at	FGF2	-0.881038165	9.72006E-05
206574_s_at	PTP4A3	-0.668933325	9.824E-05
230836_at	ST8SIA4	-0.805567735	9.90446E-05
205479_s_at	PLAU	-0.840686441	9.90564E-05
1554741_s_at	FGF7	-1.020559579	9.98781E-05
223502_s_at	TNFSF13B	-0.81699064	9.98781E-05
204220_at	GMFG	-0.709233405	0.000100935
211980_at	COL4A1	-0.677196767	0.000102974
230925_at	APBB1IP	-0.743389254	0.000104163
226142_at	GLIPR1	-0.700543623	0.000104163
203765_at	GCA	-0.785955552	0.000105391
204575_s_at	MMP19	-0.741372134	0.000105391
225269_s_at	RBMS1	-0.626634603	0.000108382
223553_s_at	DOK3	-0.890481826	0.000108622
1558397_at	PECAM1	-0.733215539	0.000109736
201426_s_at	VIM	-0.691166287	0.000109736
212122_at	RHOQ	-0.680798044	0.000109787
217388_s_at	KYNU	-1.000697366	0.000112937
211966_at	COL4A2	-0.598449622	0.000113055
213001_at	ANGPTL2	-0.767205234	0.000113115
204475_at	MMP1	-1.418103105	0.000116666
228176_at	S1PR3	-0.882175075	0.000117731
220187_at	STEAP4	-0.764319085	0.000119217
202998_s_at	LOXL2	-0.753301335	0.000119217

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226218_at	IL7R	-0.925847489	0.000120617
227654_at	FAM65C	-0.700764658	0.000121336
210663_s_at	KYNU	-0.72380226	0.000121457
213338_at	TMEM158	-0.839452104	0.00012193
209191_at	TUBB6	-0.587378918	0.000124081
204951_at	RHOH	-0.806738536	0.000124716
216243_s_at	IL1RN	-1.100981799	0.000125867
228863_at	PCDH17	-0.813469203	0.000128572
216950_s_at	FCGR1A	-0.751171615	0.000128572
215838_at	LILRA5	-0.840085006	0.000128664
227295_at	IKBIP	-0.645166586	0.000128678
203921_at	CHST2	-0.586701449	0.000131247
216841_s_at	SOD2	-0.723284064	0.000133342
235489_at	RHOJ	-0.786442332	0.000135943
204620_s_at	VCAN	-0.793136691	0.000136526
211896_s_at	DCN	-0.928130552	0.000136726
225842_at	PHLDA1	-0.615733995	0.000137104
235593_at	ZEB2	-0.60655267	0.000153167
201666_at	TIMP1	-0.615437631	0.000158138
219134_at	ELTD1	-0.783712774	0.000160229
204337_at	RGS4	-0.589232932	0.000161701
204014_at	DUSP4	-0.756981571	0.000162274
225285_at	BCAT1	-0.830298166	0.000164506
210889_s_at	FCGR2B	-0.802132383	0.000164693
221724_s_at	CLEC4A	-0.659685245	0.000164785
218353_at	RGS5	-0.722727457	0.00016553
209959_at	NR4A3	-0.723479763	0.000177291
203910_at	ARHGAP29	-0.611566507	0.000179377
201069_at	MMP2	-0.867643181	0.000182615
221581_s_at	LAT2	-0.630352798	0.000182615
207691_x_at	ENTPD1	-0.6665533	0.000184094
210118_s_at	IL1A	-1.148749074	0.000194115
205569_at	LAMP3	-0.995168778	0.000198476
221730_at	COL5A2	-0.868573677	0.000200731
202112_at	VWF	-0.646283192	0.000201597
202464_s_at	PFKFB3	-0.686713341	0.000203177
227361_at	HS3ST3B1	-0.880027749	0.000204617
208885_at	LCP1	-0.715354272	0.00020529
223501_at	TNFSF13B	-0.751745651	0.000206592
202196_s_at	DKK3	-0.613582877	0.000207223
226695_at	PRRX1	-0.983360891	0.000212918
229450_at	IFIT3	-0.812928796	0.000212918
217996_at	PHLDA1	-0.790398086	0.00021612
226722_at	FAM20C	-0.60041489	0.000216795
229435_at	GLIS3	-0.799677135	0.000221945
37145_at	GNLY	-0.950235275	0.00023752
204882_at	ARHGAP25	-0.59964966	0.000238447
213258_at	TFPI	-0.818069197	0.00024718
207674_at	FCAR	-0.816939328	0.000252187
211806_s_at	KCNJ15	-0.64312729	0.000255847

Predict the response to anti-TNF therapy

210815_s_at	CALCRL	-0.629011774	0.000256068
201893_x_at	DCN	-0.792890183	0.00026694
204971_at	CSTA	-0.983119025	0.000267112
205729_at	OSMR	-0.675630684	0.000275565
212154_at	SDC2	-0.587906256	0.000279182
227099_s_at	C11orf96	-0.827718353	0.000283741
211813_x_at	DCN	-0.78085573	0.000290399
218871_x_at	CSGALNACT2	-0.590331851	0.000291482
200795_at	SPARCL1	-0.632887912	0.000296253
217312_s_at	COL7A1	-0.68358361	0.000297801
212587_s_at	PTPRC	-0.899199424	0.000302664
213241_at	PLXNC1	-0.776651902	0.000315883
209474_s_at	ENTPD1	-0.713619199	0.000324068
226757_at	IFIT2	-0.83698135	0.000324924
202450_s_at	CTSK	-0.733405348	0.00032991
215783_s_at	ALPL	-0.627895784	0.000333951
230741_at	P2RX7	-0.753246744	0.000336503
205786_s_at	ITGAM	-0.683714689	0.000337018
206157_at	PTX3	-0.994515992	0.000337346
201105_at	LGALS1	-0.649357645	0.000345779
228754_at	SLC6A6	-0.644639137	0.000351801
210004_at	OLR1	-0.779865569	0.000353587
221731_x_at	VCAN	-0.805261622	0.000362833
209676_at	TFPI	-0.734663194	0.000365722
202638_s_at	ICAM1	-0.824489322	0.000373699
211795_s_at	FYB	-0.724071585	0.00038253
202766_s_at	FBN1	-0.738648591	0.00038555
228776_at	GJC1	-0.595222959	0.000387511
212265_at	QKI	-0.631280155	0.000397461
226545_at	CD109	-0.634665841	0.000400439
203083_at	THBS2	-0.992444925	0.000403587
204797_s_at	EML1	-0.612420172	0.000422159
1557905_s_at	CD44	-0.590194449	0.000422528
228501_at	GALNT15	-0.602616764	0.000432518
202663_at	WIPF1	-0.612500813	0.000453779
211668_s_at	PLAU	-0.862189504	0.000460016
215646_s_at	VCAN	-0.811978347	0.000477042
204614_at	SERPINB2	-0.800416251	0.000477042
205612_at	MMRN1	-0.713995362	0.000480618
211756_at	PTHLH	-0.834932699	0.000487136
219888_at	SPAG4	-0.637110782	0.000512055
217999_s_at	PHLDA1	-0.598323308	0.000526113
203085_s_at	TGFB1	-0.629661835	0.000528388
205495_s_at	GNLY	-0.829717105	0.000533003
216598_s_at	CCL2	-0.970885121	0.00053498
214085_x_at	GLIPR1	-0.640510705	0.000541699
211742_s_at	EVI2B	-0.59490133	0.00054537
215990_s_at	BCL6	-0.601601725	0.000556036
212636_at	QKI	-0.63449189	0.00055985
217552_x_at	CR1	-0.649494903	0.000584428

Predict the response to anti-TNF therapy

201744_s_at	LUM	-0.615560746	0.000599114
203435_s_at	MME	-1.009916824	0.000605904
208763_s_at	TSC22D3	-0.664538576	0.000608094
204115_at	GNG11	-0.598787512	0.000626327
217502_at	IFIT2	-0.598746688	0.000649296
212262_at	QKI	-0.599684835	0.000664733
204464_s_at	EDNRA	-0.641826092	0.000675408
209795_at	CD69	-0.943955748	0.00069893
202760_s_at	AKAP2	-0.633639521	0.000737513
204236_at	FLI1	-0.642407113	0.000753718
1552772_at	CLEC4D	-0.642369626	0.000755883
207238_s_at	PTPRC	-0.816978003	0.000761994
215446_s_at	LOX	-0.667621746	0.000792646
1555167_s_at	NAMPT	-0.789123238	0.000802804
206637_at	P2RY14	-0.712333821	0.00080816
203416_at	CD53	-0.658893351	0.000808416
217739_s_at	NAMPT	-0.611813637	0.000828343
210163_at	CXCL11	-1.239985064	0.000834121
207677_s_at	NCF4	-0.631673776	0.000854501
231240_at	DIO2	-0.586569669	0.000854501
203131_at	PDGFRA	-0.594277825	0.000854803
214038_at	CCL8	-1.005064363	0.00086676
202957_at	HCLS1	-0.710750265	0.000875697
226930_at	FNDC1	-0.667900523	0.000888527
213194_at	ROBO1	-0.706548036	0.000942197
206643_at	HAL	-0.649977338	0.000942197
226769_at	FIBIN	-0.597986558	0.000947871
219410_at	TMEM45A	-0.744832782	0.000951773
226777_at	ADAM12	-0.683893045	0.000959361
212956_at	TBC1D9	-0.616002359	0.001089595
212067_s_at	C1R	-0.587122525	0.001107014
215966_x_at	GK3P	-0.60564969	0.001120294
1555229_a_at	C1S	-0.904102207	0.001133677
206978_at	CCR2	-0.604267876	0.001172105
225710_at	GNB4	-0.61332375	0.001173806
238623_at	RP3-428L16.2	-0.727757421	0.001190154
204774_at	EVI2A	-0.692091922	0.001201541
210140_at	CST7	-0.602142017	0.001216726
201438_at	COL6A3	-0.727202716	0.00122877
212263_at	QKI	-0.656944199	0.00122877
215388_s_at	CFH	-0.603561942	0.001249922
232843_s_at	DOCK8	-0.608776865	0.001353461
203185_at	RASSF2	-0.668241557	0.001423751
225442_at	DDR2	-0.590747586	0.001425273
226517_at	BCAT1	-0.856491914	0.001461733
207387_s_at	GK	-0.65306999	0.00149529
1559777_at	LOC731424	-0.793627389	0.001504198
205419_at	GPR183	-0.703127711	0.001509776
201289_at	CYR61	-0.963657069	0.001522267
201720_s_at	LAPTM5	-0.602329592	0.001524712

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203434_s_at	MME	-1.239768583	0.001555006
208747_s_at	C1S	-0.668503366	0.001577871
222529_at	SLC25A37	-0.605570242	0.001582113
211571_s_at	VCAN	-0.694667313	0.001732231
229554_at	LUM	-0.771579578	0.001756929
227266_s_at	FYB	-0.710677532	0.001801324
231577_s_at	GBP1	-0.631412411	0.001826593
214146_s_at	PPBP	-0.646703574	0.001877617
221060_s_at	TLR4	-0.624694628	0.001905732
225502_at	DOCK8	-0.695555663	0.001962381
227769_at	GPR27	-0.599558663	0.001992731
205234_at	SLC16A4	-0.886272269	0.002022123
210764_s_at	CYR61	-0.871777554	0.002077478
201667_at	GJA1	-0.654512225	0.002096366
206515_at	CYP4F3	-0.744341591	0.002160157
215671_at	PDE4B	-0.662816873	0.002170152
202269_x_at	GBP1	-0.632754354	0.002231492
229437_at	MIR155	-0.838893692	0.00225206
209723_at	SERPINB9	-0.688324669	0.002286067
213060_s_at	CHI3L2	-0.697461369	0.002465326
209374_s_at	IGHM	-0.684039102	0.002472607
202403_s_at	COL1A2	-0.70878603	0.002517295
209167_at	GPM6B	-0.738062592	0.002605672
205174_s_at	QPCT	-0.61669791	0.002630935
216541_x_at	IGHG1	-0.791829608	0.002640312
211122_s_at	CXCL11	-1.180977789	0.002724499
202803_s_at	ITGB2	-0.622744686	0.002724499
212588_at	PTPRC	-0.72559573	0.002730967
227070_at	GLT8D2	-0.594447764	0.002845579
217378_x_at	IGKV10R2-108	-0.674007345	0.002850841
211634_x_at	IGHM	-0.864224302	0.002989902
213429_at	BICC1	-0.632133229	0.003052347
217157_x_at	IGK	-0.668299946	0.003158757
215949_x_at	IGHM	-0.685855498	0.003351912
227458_at	CD274	-0.696668647	0.003380926
211919_s_at	CXCR4	-0.641408246	0.003380926
224404_s_at	FCRL5	-0.662993656	0.003391602
217480_x_at	AC128677.4	-0.615019477	0.003397832
204733_at	KLK6	-0.649832101	0.003439739
244313_at	CR1	-0.733364807	0.003532701
217028_at	CXCR4	-0.789885778	0.00364389
214768_x_at	IGKC	-0.841059642	0.003737421
210145_at	PLA2G4A	-0.627624955	0.003763772
211635_x_at	IGHA1	-0.770515735	0.003979684
223343_at	MS4A7	-0.634872865	0.004090082
228167_at	KLHL6	-0.79278858	0.004099746
207030_s_at	CSRP2	-0.640886299	0.004172993
219890_at	CLEC5A	-0.618551356	0.004216676
206115_at	EGR3	-0.678912052	0.004253008
209792_s_at	KLK10	-1.303182152	0.004373244

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210164_at	GZMB	-0.678893825	0.004490092
211645_x_at	IGKV1-17	-0.735314969	0.004527579
216829_at	IGK	-0.775282237	0.004589218
216207_x_at	IGKC	-0.638040703	0.004646695
216576_x_at	IGK	-0.740572787	0.004677141
217235_x_at	IGLL5	-0.632207398	0.004690275
223122_s_at	SFRP2	-0.782256388	0.004850306
216412_x_at	CKAP2	-0.66829553	0.005016617
203645_s_at	CD163	-0.620482152	0.005168228
216401_x_at	IGKV1-37	-0.675724425	0.005349581
222838_at	SLAMF7	-0.679835331	0.005545868
211798_x_at	IGLJ3	-0.68025328	0.005853108
215176_x_at	IGK	-0.641437704	0.005853108
229391_s_at	FAM26F	-0.751789933	0.005959053
216984_x_at	CKAP2	-0.603163481	0.006035529
204533_at	CXCL10	-0.885858145	0.006064437
206522_at	MGAM	-1.340259739	0.006075103
239381_at	KLK7	-0.587147671	0.006122144
204470_at	CXCL1	-0.654366764	0.00612981
217997_at	PHLDA1	-0.593360167	0.006301586
221729_at	COL5A2	-0.668017822	0.006401023
215049_x_at	CD163	-0.6316974	0.006424911
213817_at	IRAK3	-0.599721307	0.006478402
216365_x_at	CKAP2	-0.589375043	0.006583605
234366_x_at	CKAP2	-0.780199567	0.006792428
222162_s_at	ADAMTS1	-0.625170428	0.006873393
201852_x_at	COL3A1	-0.664459892	0.00709408
211641_x_at	IGHA1	-0.639767331	0.007161165
219159_s_at	SLAMF7	-0.593515052	0.007161165
211430_s_at	IGHG1	-0.623731788	0.00718987
215076_s_at	COL3A1	-0.599929812	0.007204831
201012_at	ANXA1	-0.628794743	0.007232025
217281_x_at	IGH	-0.719005049	0.007308562
206513_at	AIM2	-0.61860309	0.007337077
217258_x_at	IGLV1-44	-0.700347822	0.007412134
204619_s_at	VCAN	-0.590752682	0.007827189
211644_x_at	IGK	-0.674220839	0.008106196
211643_x_at	IGK	-0.733306573	0.008237239
205767_at	EREG	-0.884097879	0.008281549
211640_x_at	IGHG1	-0.714857283	0.008562228
229390_at	FAM26F	-0.706087367	0.008845448
209335_at	DCN	-0.635196508	0.008876434
201842_s_at	EFEMP1	-0.59345919	0.008970348
217148_x_at	IGLC1	-0.642713801	0.009284851
209685_s_at	PRKCB	-0.58836327	0.009287805
209170_s_at	GPM6B	-0.695647685	0.009455365
210029_at	IDO1	-0.929858361	0.009459907
217232_x_at	HBB	-0.941305937	0.00957939
216853_x_at	IGLJ3	-0.661155142	0.009717965
224694_at	ANTXR1	-0.596404293	0.009999643

FC: fold change; adj. P. Val: adjusted *P* value.

Predict the response to anti-TNF therapy

Table S2. The enriched GO term among DEGs in responders vs. non-responders

GO ID	Term	Count	FDR
GO:0009611	Response to wounding	85	1.00E-38
GO:0006955	Immune response	95	3.24E-38
GO:0006952	Defense response	80	1.78E-29
GO:0006954	Inflammatory response	59	2.27E-28
GO:0006935	Chemotaxis	32	4.34E-15
GO:0042330	Taxis	32	4.34E-15
GO:0007155	Cell adhesion	58	6.66E-11
GO:0022610	Biological adhesion	58	7.00E-11
GO:0042060	Wound healing	28	2.40E-09
GO:0007626	Locomotory behavior	33	3.91E-09
GO:0002237	Response to molecule of bacterial origin	19	1.75E-08
GO:0048584	Positive regulation of response to stimulus	29	6.78E-08
GO:0050778	Positive regulation of immune response	23	7.35E-08
GO:0002684	Positive regulation of immune system process	29	8.30E-08
GO:0007610	Behavior	41	1.53E-07
GO:0032496	Response to lipopolysaccharide	17	2.83E-07
GO:0001775	Cell activation	31	3.20E-07
GO:0009617	Response to bacterium	25	6.71E-07
GO:0002252	Immune effector process	21	7.77E-07
GO:0010033	Response to organic substance	51	9.71E-07
GO:0001817	Regulation of cytokine production	24	1.02E-06
GO:0042127	Regulation of cell proliferation	53	2.32E-06
GO:0032101	Regulation of response to external stimulus	22	2.84E-06
GO:0031349	Positive regulation of defense response	15	1.21E-05
GO:0045321	Leukocyte activation	25	6.27E-05
GO:0006928	Cell motion	36	1.05E-04
GO:0050727	Regulation of inflammatory response	14	1.77E-04
GO:0016477	Cell migration	26	1.93E-04
GO:0001819	Positive regulation of cytokine production	15	1.96E-04
GO:0045087	Innate immune response	18	2.94E-04
GO:0051240	Positive regulation of multicellular organismal process	24	3.08E-04
GO:0002822	Regulation of adaptive immune response based on somatic recombination of immune receptors built from immunoglobulin superfamily domains	12	3.27E-04
GO:0002253	Activation of immune response	15	3.44E-04
GO:0002819	Regulation of adaptive immune response	12	3.98E-04
GO:0008284	Positive regulation of cell proliferation	32	4.43E-04
GO:0042327	Positive regulation of phosphorylation	15	5.13E-04
GO:0001944	Vasculature development	24	5.13E-04
GO:0002274	Myeloid leukocyte activation	11	5.20E-04
GO:0032675	Regulation of interleukin-6 production	10	5.72E-04
GO:0045937	Positive regulation of phosphate metabolic process	15	7.53E-04
GO:0010562	Positive regulation of phosphorus metabolic process	15	7.53E-04
GO:0001934	Positive regulation of protein amino acid phosphorylation	14	0.001186772
GO:0001568	Blood vessel development	23	0.001319218
GO:0051674	Localization of cell	26	0.00145166
GO:0048870	Cell motility	26	0.00145166
GO:0007599	Hemostasis	15	0.001961943
GO:0006875	Cellular metal ion homeostasis	20	0.002416713

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GO:0007243	Protein kinase cascade	28	0.004413672
GO:0055065	Metal ion homeostasis	20	0.004741619
GO:0030198	Extracellular matrix organization	14	0.007183658
GO:0001932	Regulation of protein amino acid phosphorylation	18	0.007244501
GO:0006909	Phagocytosis	10	0.007669228
GO:0001501	Skeletal system development	25	0.009615742
GO:0050878	Regulation of body fluid levels	16	0.010132895
GO:0008283	Cell proliferation	30	0.011652505
GO:0007159	Leukocyte adhesion	8	0.012146331
GO:0051174	Regulation of phosphorus metabolic process	32	0.012461221
GO:0019220	Regulation of phosphate metabolic process	32	0.012461221
GO:0035295	Tube development	20	0.013346479
GO:0009968	Negative regulation of signal transduction	20	0.014254847
GO:0007166	Cell surface receptor linked signal transduction	81	0.014482631
GO:0042325	Regulation of phosphorylation	31	0.015307187
GO:0051092	Positive regulation of NF-kappaB transcription factor activity	9	0.019341547
GO:0050729	Positive regulation of inflammatory response	8	0.019938689
GO:0002824	Positive regulation of adaptive immune response based on somatic recombination of immune receptors built from immunoglobulin superfamily domains	8	0.019938689
GO:0002526	Acute inflammatory response	13	0.020908705
GO:0010648	Negative regulation of cell communication	21	0.021443884
GO:0002683	Negative regulation of immune system process	12	0.022553978
GO:0002821	Positive regulation of adaptive immune response	8	0.025164656
GO:0032680	Regulation of tumor necrosis factor production	8	0.025164656
GO:0019221	Cytokine-mediated signaling pathway	11	0.028569661
GO:0007596	Blood coagulation	13	0.031583157
GO:0050817	Coagulation	13	0.031583157
GO:0002443	Leukocyte mediated immunity	12	0.031812745
GO:0050900	Leukocyte migration	10	0.033250361
GO:0007242	Intracellular signaling cascade	59	0.047339223
GO:0009991	Response to extracellular stimulus	19	0.04816481

GO: gene ontology; FDR: false discovery rate.