

User Manual of ImmunoCompare

February 10, 2022

ImmunoCompare is an omics-based target validation tool, which can query candidate targets and biological conditions (e.g. diseases, organisms, treatments, tissues or cell types) together to reveal whether candidates are differentially expressed under conditions (e.g. whether a gene has significantly higher expression in non-responders than responders in most of IBD transcriptomic datasets). ImmunoCompare can also query candidate targets from AbbVie internal target lists and from multiple public databases (e.g. DrugBank, PharmGKB, and GWAS Catalog). Currently, ImmunoCompare contains 13 microarray datasets, 25 bulk RNASeq datasets, 24 proteomics datasets, 16 single-cell RNASeq datasets, and 3 AbbVie target lists spanning 12 diseases and can query 9 external databases.

1. Input query genes

Clicking the “GENES” menu, a user can input the interesting genes. Multiple genes should be separated by comma.

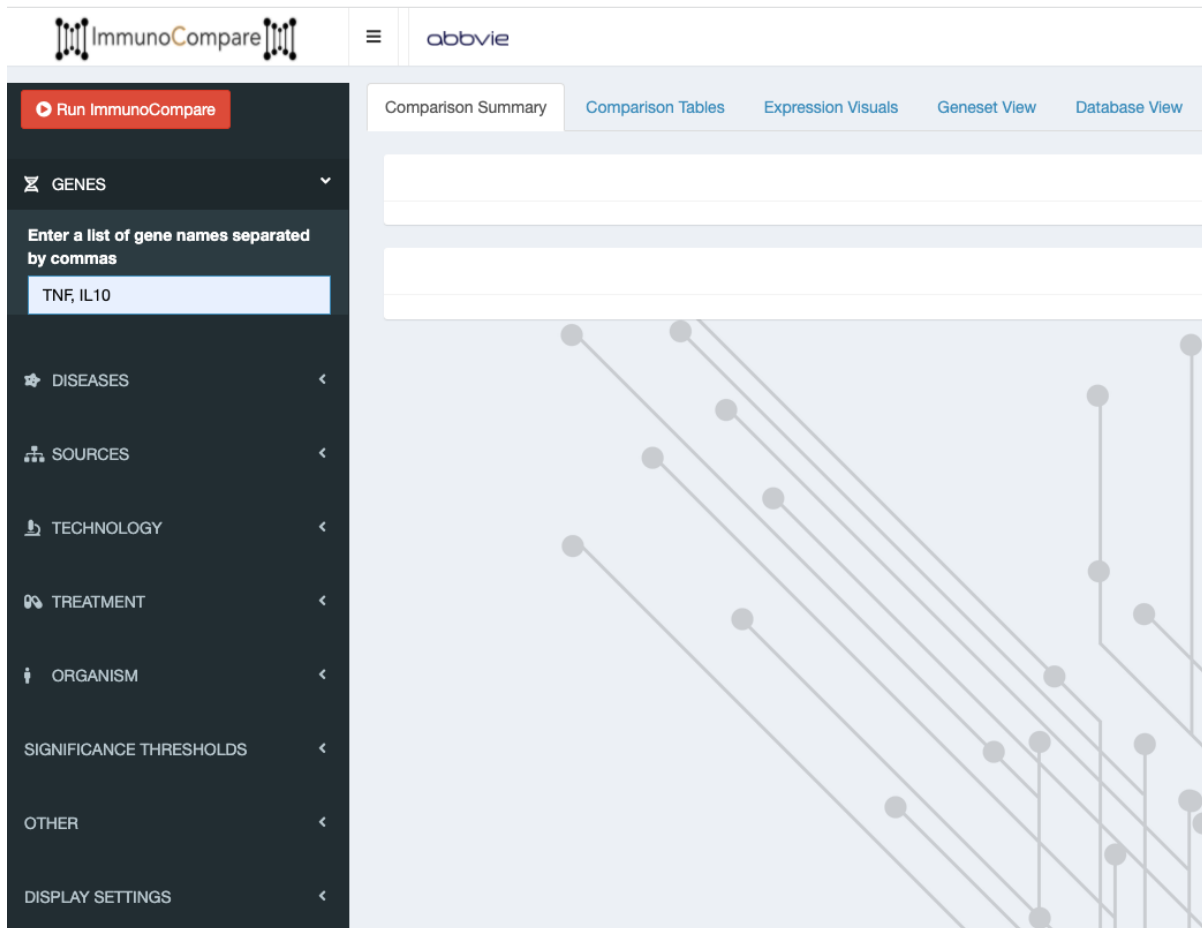


Figure 1. Interesting gene input

2. Select disease of interest

Clicking on the “DISEASE” menu, a user can select one or multiple diseases of interest from the dropdown menu.

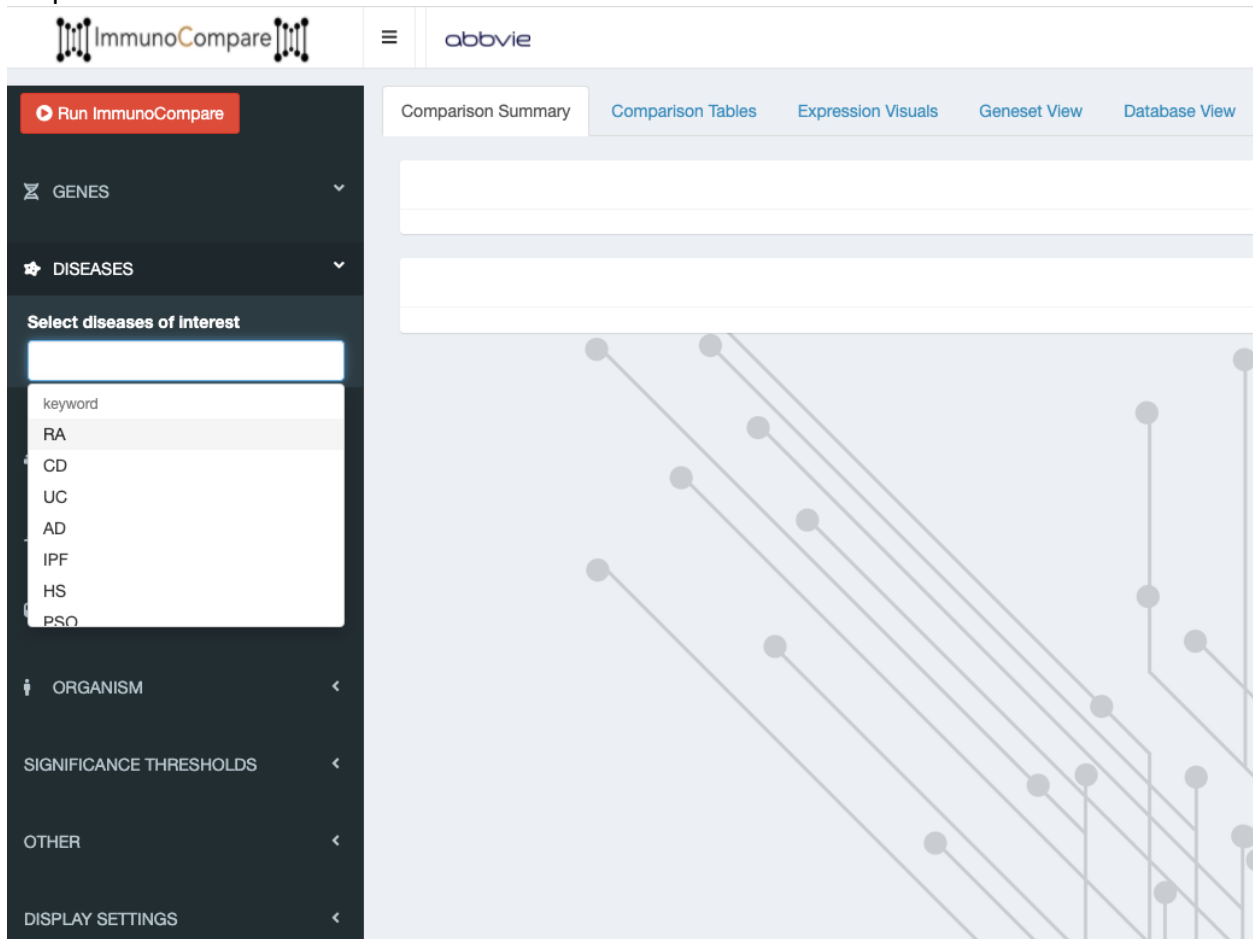


Figure 2. Selection of interesting diseases

3. Select technology of interest

Clicking “TECHNOLOGY” menu and then clicking “Experiment Type” menu, the user can select one or multiple experiment types (e.g. Microarray and RNASeq) from the dropdown menu.

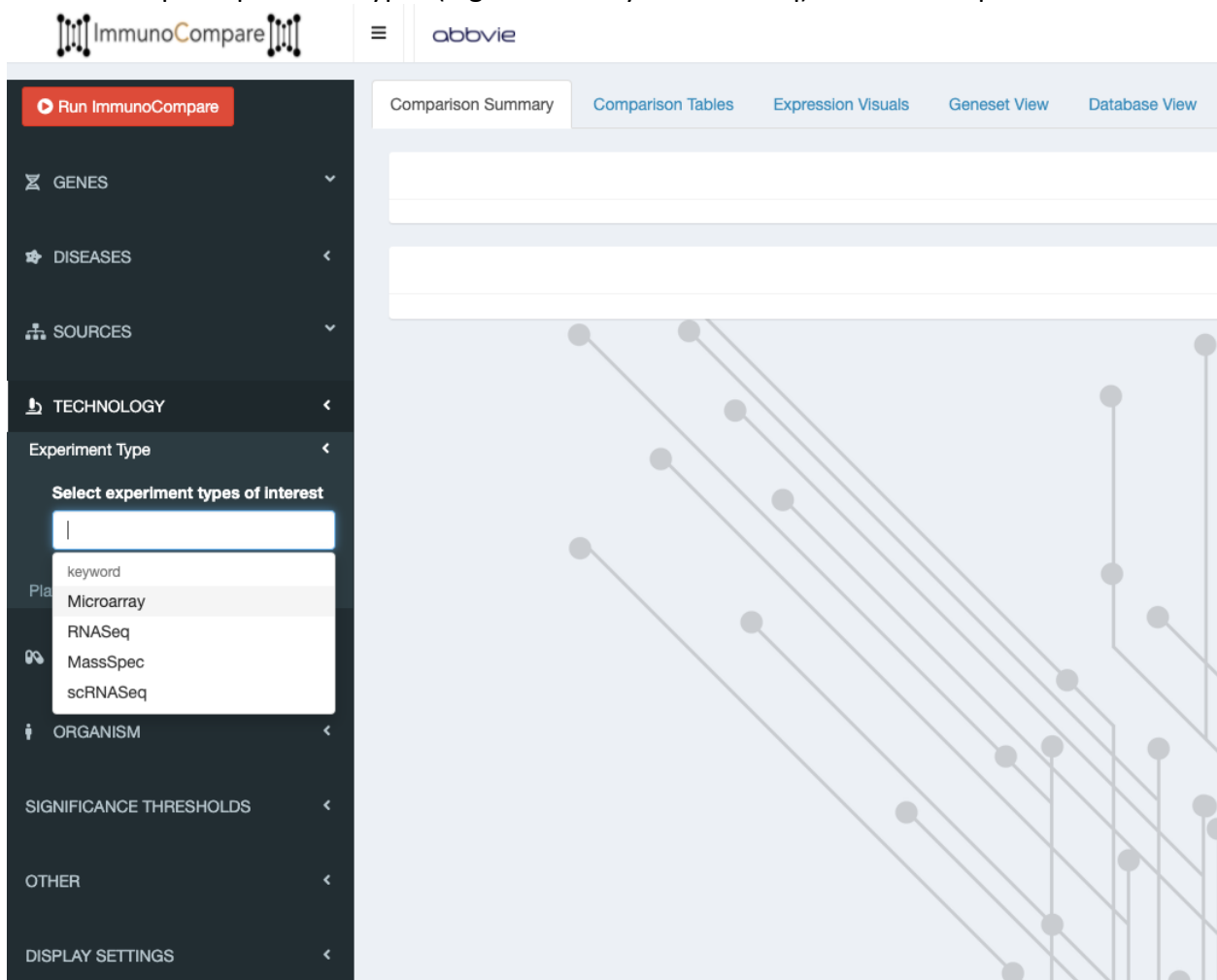


Figure 3. Selection of interesting experiment types

The user can set other interesting parameters (e.g. organism or treatment) based on the same method.

4. Comparison Summary

After setting the parameters, the user can click “Run ImmunoCompare” button to get the query results, which may take 20-30 seconds.

“Comparison Summary” tab shows the summary of query results based on datasets and comparisons in each disease. For example, “TNF – found in 6 datasets (44 comparisons)” means TNF is included in 6 datasets that contain totally 44 comparisons. “Summary Metrics” shows the number of datasets and comparisons that the TNF is significant based on the significant threshold (default is $p < 0.05$ & $\log FC > 0.5$).

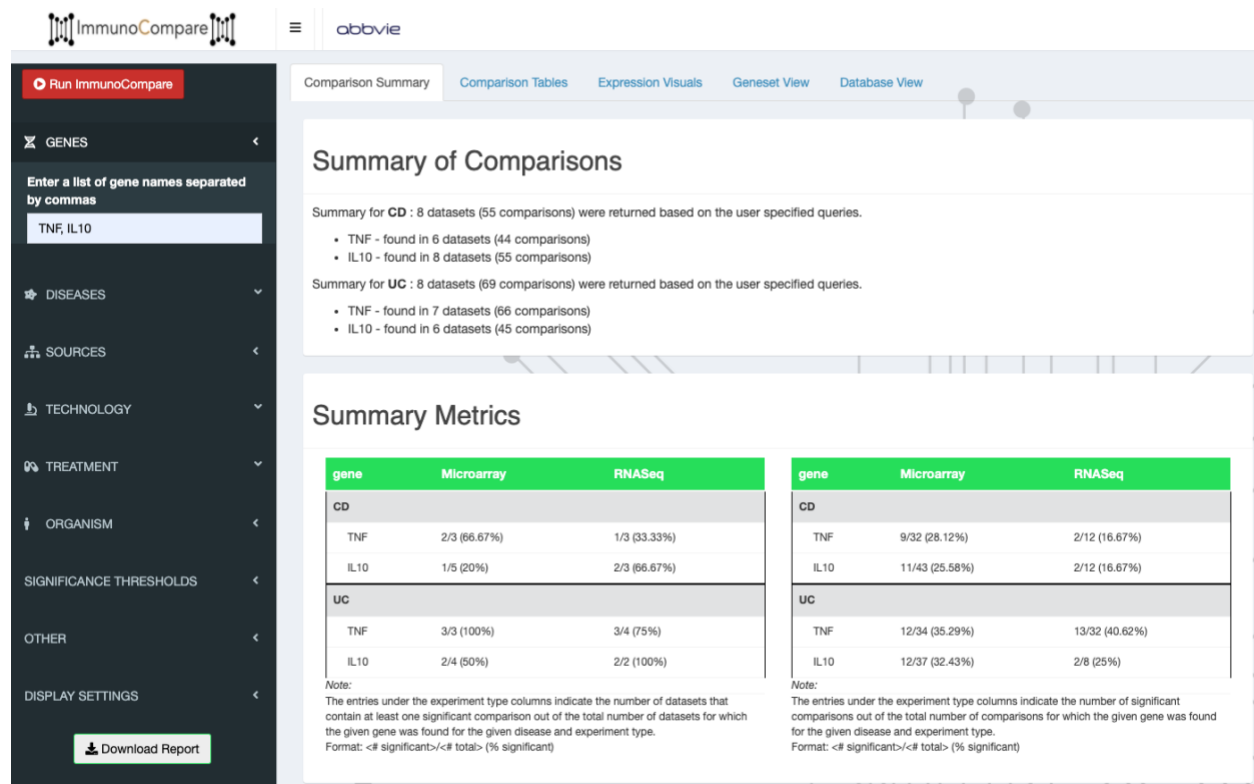


Figure 4. Summary of Comparisons

5. Comparison Tables and Expression Visuals

Clicking the “Comparison Tables” tab, the user can get all detailed information about “Summary Metrics” in the “Comparison Summary” tab. The table includes the description of each dataset and comparison and whether the interesting genes are significant in the comparison. “NS” means interesting gene is not significant in the comparison while red and blue “info” button represent the interesting gene is significantly up- or down-regulated in the comparison. Hanging over the “info” button can get the detailed statistic result. The directionality of the comparison can be found in the “comparison” column. For example, “NonInvolvedArea vs InflamedArea” means up-regulated gene has higher expression in NonInvolvedArea compared with InflamedArea.

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Comparison Summary | **Comparison Tables** | Expression Visuals | Geneset View | Database View

Display of Selected Comparisons

The following output contains comparisons that meet the user specified criteria.

- genes - TNF, IL10
- diseases - CD, UC
- sources -
- technology - Microarray, RNASeq
- treatments -
- organisms - Human

Clicking the dataset ID's in the first column of the following table(s) will navigate you to a page associated with the given dataset where you can further explore the data. Hovering over a cell containing **info** in the following table(s) will generate a popup with related information for the given comparison and gene (i.e. p-value, q-value, and \log_2 (fold change)). Not all genes may have been found for a given data set or comparison. An **NA** in the following table(s) indicates the given gene was not found in the given dataset. Datasets that meet the user specified queries, but do not contain any of the user specified genes are omitted from the following output. An **NS** in the following table(s) indicates the given gene did not pass the thresholds specified for the p-value and \log_2 (fold change).

Filter Comparisons | Clear Selections | Generate Visuals

The following table(s) display data from datasets associated with CD

data ID	group	comparison	TNF	IL10	Row/Plot Selection
Title: A functional genomics predictive network model identifies regulators of inflammatory bowel disease: Microarray Analysis of Human Blood and Intestinal Biopsy Samples from a Phase 2b, Double-blind, Placebo-controlled Study of Ustekinumab in Crohn's Disease Organism: Human Experiment Type: Microarray Source: Colon;Ileum;Rectum					
GSE100833	Colon	NonInvolvedArea vs InflamedArea	info		<input checked="" type="checkbox"/>
GSE100833	Rectum	NonInvolvedArea vs InflamedArea	info	NS	<input type="checkbox"/>
Title: Mucosal expression profiling in patients with inflammatory bowel disease before and after first infliximab treatment Organism: Human Experiment Type: Microarray Source: Colon;Ileum					
GSE16879	Colon	NonResponder, W0, CD vs Control	info	info	<input type="checkbox"/>
GSE16879	Colon	NonResponder, W4_6, CD vs Control	info	info	<input type="checkbox"/>
GSE16879	Colon	Responder, W4_6, UC vs Control	NS	info	<input type="checkbox"/>
GSE16879	Colon	NonResponder, W0, UC vs Control	info	info	<input type="checkbox"/>

Tooltip: name: TNF logFC: -0.765 p-value: 0 adj p-value: 0

Figure 5. Comparison table

Selecting the one or multiple comparisons from one or multiple datasets using “Row/Plot Selection” checkboxes and clicking “Generate Visuals” button, the user can plot the boxplots related to the selected comparisons.

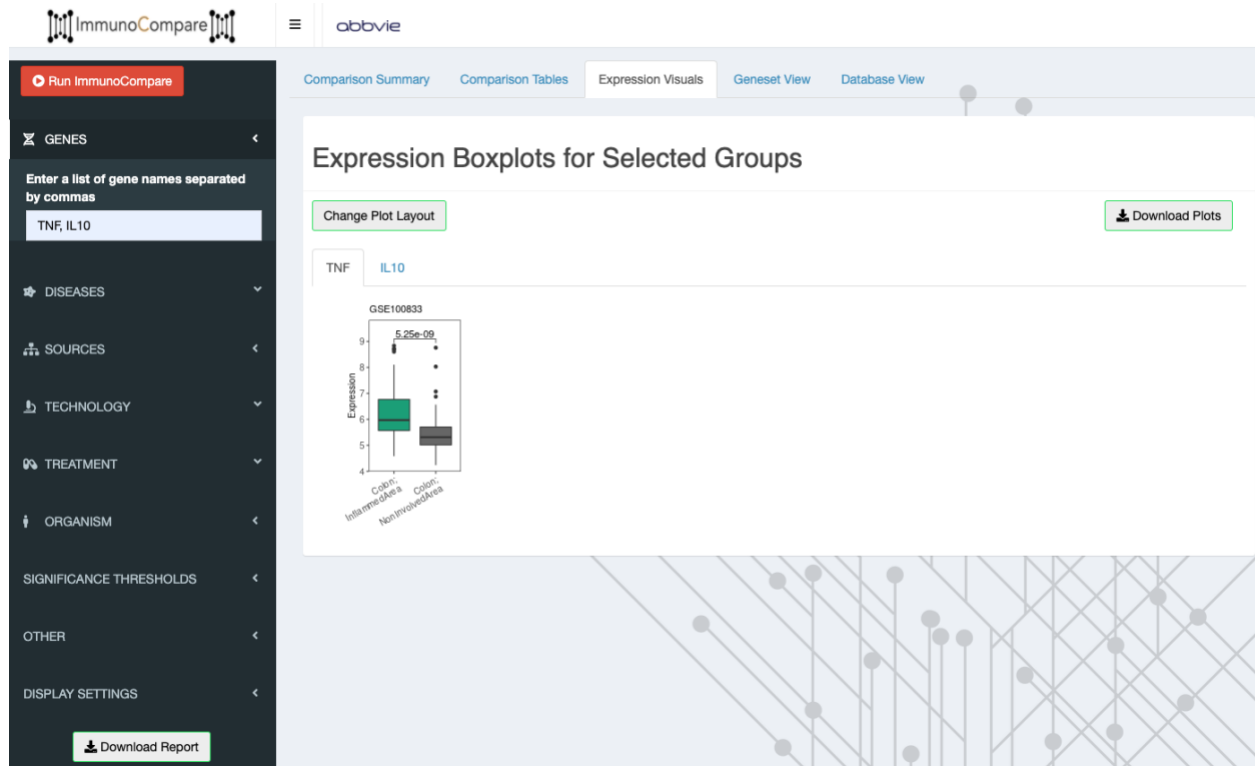


Figure 6. Expression Visuals

5. Geneset View and Database View

Under the “Geneset View”, the user can check whether the interesting genes are included in the genesets related to query parameters (e.g. disease).

“Database View” tab provides the links of interesting genes in the public databases.

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Run ImmunoCompare

GENES

Enter a list of gene names separated by commas

TNF, IL10

DISEASES

SOURCES

TECHNOLOGY

TREATMENT

ORGANISM

SIGNIFICANCE THRESHOLDS

OTHER

DISPLAY SETTINGS

Download Report

Comparison Summary

Comparison Tables

Expression Visuals

Geneset View

Database View

Summary of Selected Genesets

The following output contains genesets that meet the user specified criteria.

- genes - TNF, IL10
- diseases - CD, UC
- organisms - Human

geneset ID	download genes	organism	type	TNF	IL10
CD					
CD_target510	download genes	Human	Transcriptomics	✓	✓
CD;UC					
IBD_genetics	download genes	Human	Genetics	✓	✓
IBD_antiTNF	download genes	Human	Transcriptomics	✓	✓

Figure 7 Geneset View

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Run ImmunoCompare

GENES

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Comparison SummaryComparison TablesExpression VisualsGeneset ViewDatabase View

Database Links

	TNF	IL10
general		
NCBI (National Center for Biotechnology Information)	link	link
function		
GO (Gene Ontology)	link	link
REACTOME	link	link
KEGG (Kyoto Encyclopedia of Genes and Genomes)	link	link
target related		
PharmGKB (Pharmacogenomics Knowledge Base)	link	link
Drug Target Commons	link	link
TTD (Therapeutic Target Database)	link	link
Drug Bank	link	link
ChEMBL	link	link

Figure 8. Database View