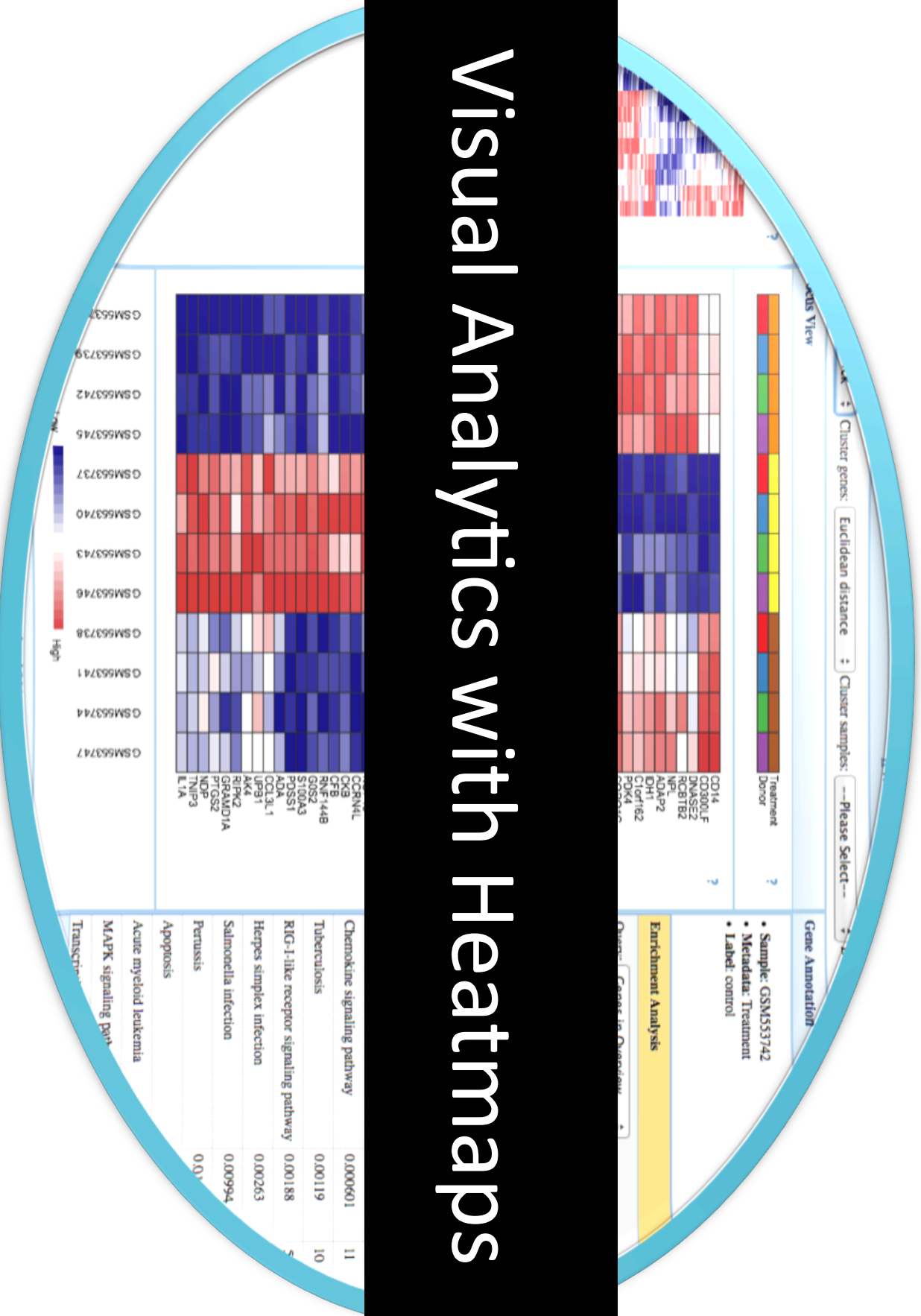


Visual Analytics with Heatmaps



Overview

Toolbar

The screenshot displays a bioinformatics software interface with the following components:

- Navigation Bar:** Home, Tutorials, FAQs, Data Format, About.
- Resolution:** Medium
- Colors:** navy-white-firebrick
- Cluster genes:** Euclidean distance
- Cluster samples:** --Please Select--
- Download:** --Please Select--
- Buttons:** Builder
- Overview Panel:** A heatmap showing gene expression data across samples. A color scale on the left ranges from blue (Low) to red (High). A vertical color bar on the right indicates the treatment for each sample.
- Focus View Panel:** A zoomed-in heatmap for a specific set of genes. A color scale on the left ranges from blue (Low) to red (High). A vertical color bar on the right indicates the treatment for each sample. The text "Last updated 2014-11-27" is visible.
- Gene Annotation Panel:** Lists genes and their associated treatments.
 - Sample: GSM553742
 - Metadata: Treatment
 - Label: control
- Enrichment Analysis Panel:** Shows a list of enriched pathways with their P-values and the number of hits.

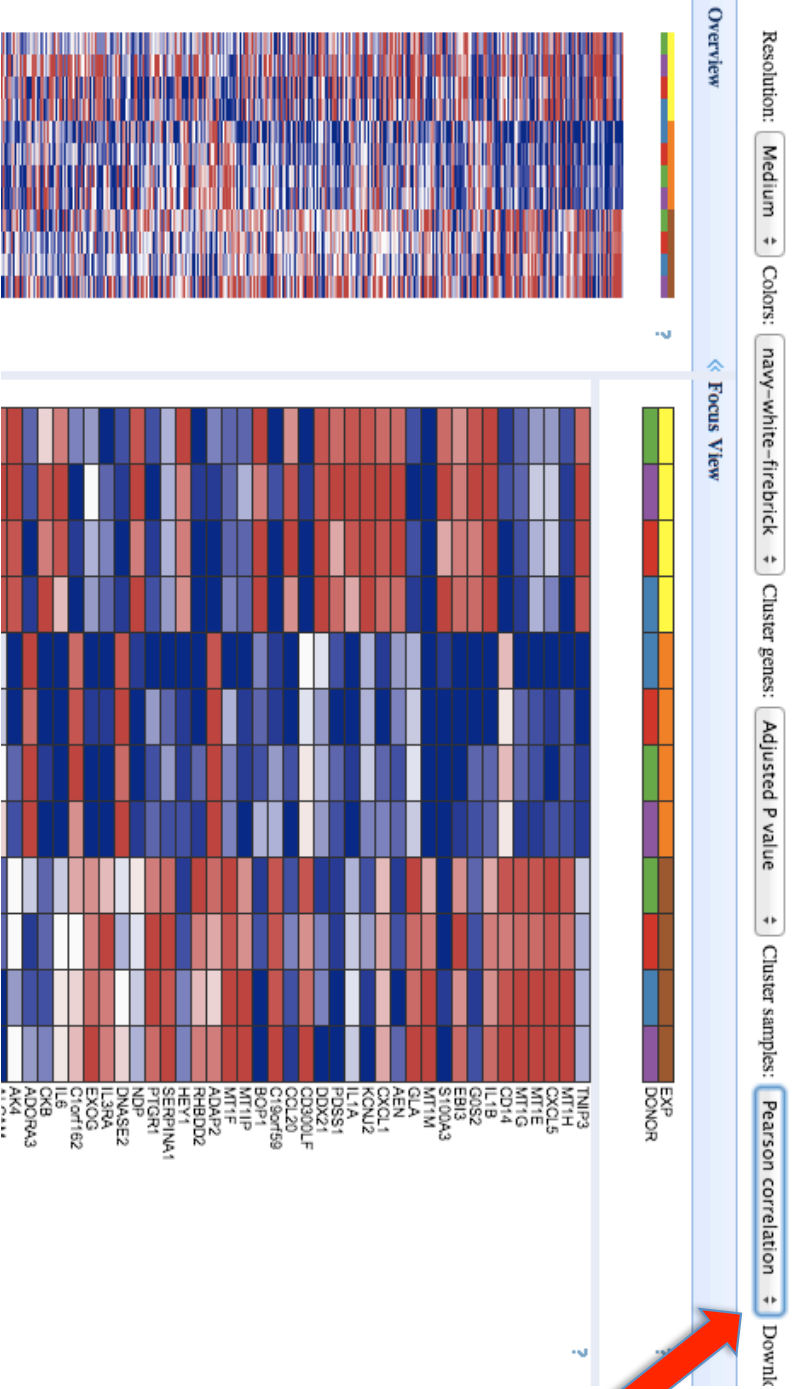
Pathway	P-value	Hits
Cytokine-cytokine receptor interaction	4.09e-10	22
Osteoclast differentiation	0.0000537	10
Toll-like receptor signaling pathway	0.0000598	9
Legionellosis	0.0000751	6
Influenza A	0.000129	9
Chemokine signaling pathway	0.000601	11
Tuberculosis	0.00119	10
RIG-I-like receptor signaling pathway	0.00188	5
Herpes simplex infection	0.00263	7
Salmonella infection	0.00994	5
Pertussis	0.0147	4
Apoptosis	0.0176	5
Acute myeloid leukemia	0.0201	4
MAPK signaling pathway	0.0224	10
Transcriptional misregulation in cancer	0.0466	2
- Define Custom Signatures Panel:** A section for defining custom signatures.

Global View

Focus View

Functional Analysis

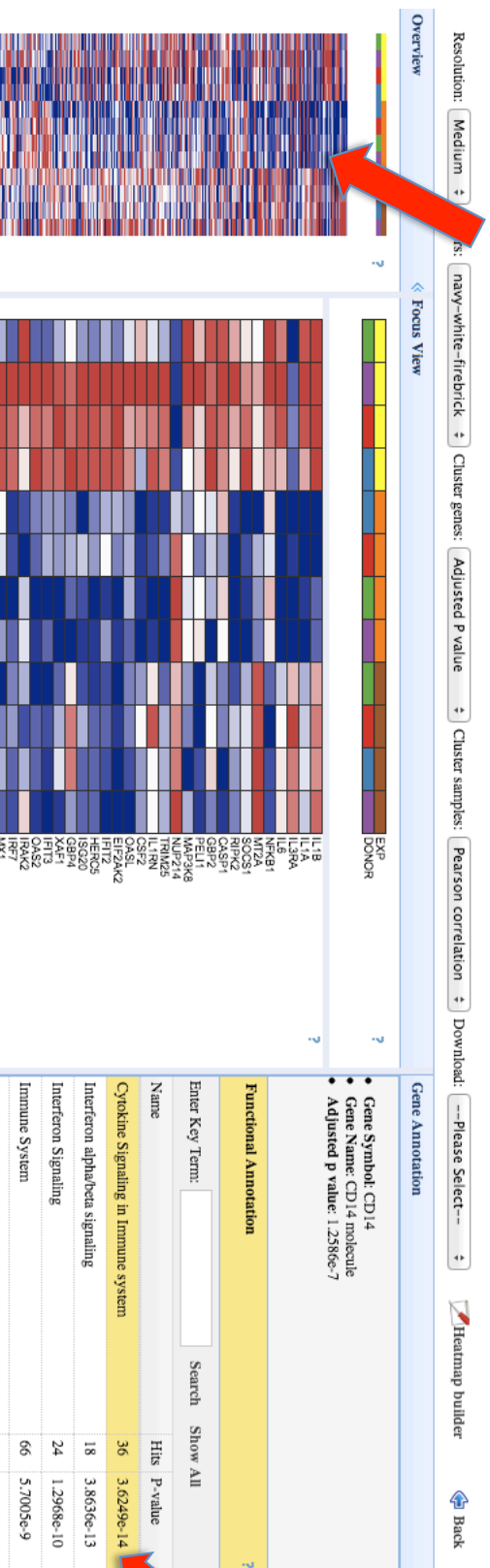
Explorer Mode: Cluster Genes



Clustering genes can reveal more striking patterns of differential gene expression

Explorer Mode: Focus View

Drag-and-select
here!

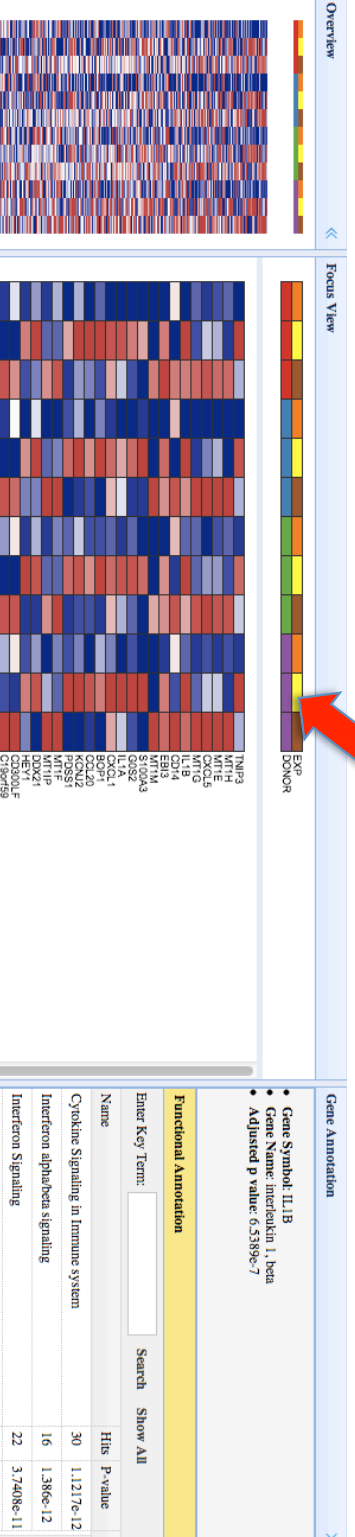


Double
click here!

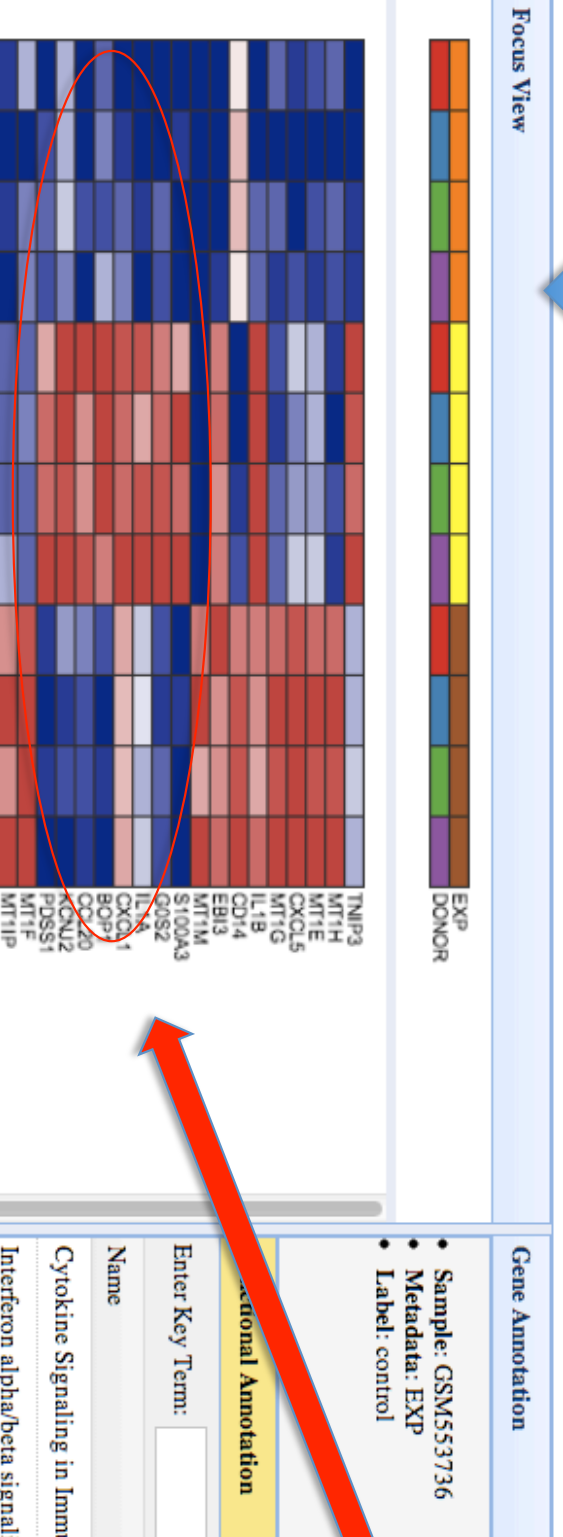
- **Focus view shows current genes/metabolites of interest:**
 - Drag and select subsets of the global view to display in the focus view
 - Double click on a functional annotation name to display associated genes in the focus view

Explorer Mode: Cluster Samples by Metadata

Click anywhere on the metadata row to order the samples by that metadata



Experimental conditions (EXP) are ordered alphabetically



Visualize the differential gene expression between different experimental conditions

Explorer Mode: Visualize Predefined Functional Groups

Focus View

EXP
DONOR

Gene Annotation

- Sample: GSM553739
- Metadata: EXP
- Label: control

Search functional annotation

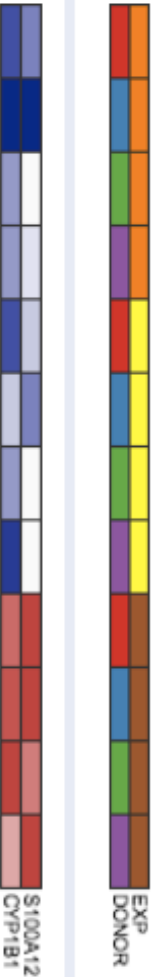
Enter Key Term: Search Show All

Name	Hits	P-value
Cytokine Signaling in Immune system	30	1.1217e-12
Interferon alpha/beta signaling	16	1.386e-12
Interferon Signaling	22	3.7408e-11

Double click to view differential expression of 16 genes associated with interferon alpha and beta signaling

Explorer Mode: Visualize a Custom Molecular Signature

Focus View



Gene Annotation


- Sample: GSM553744
- Metadata: EXP
- Label: septic

Functional Annotation

Custom Signature

Enter ID list (same type as displayed, one per row):

S100A12
CYP11B1

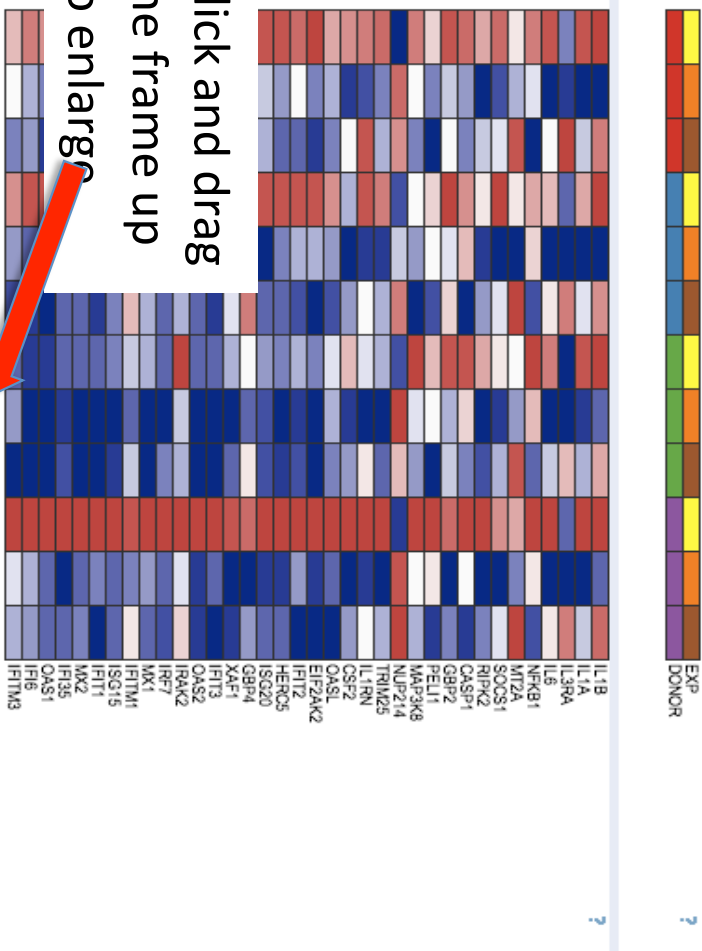


If you know which genes you are interested in, enter one or more in a list to display in the Focus View

Heatmap Builder

navy-white-firebrick Cluster genes: Adjusted P value Cluster samples: Pearson correlation Download: --Please Select-- Heatmap builder

Focus View



EXP
DONOR

IL1B
IL1A
IL3RA
IL6
NFKB1
MIZ1
SOCS1
RIPK2
CASP1
GDF2
PELI1
MAP3K8
NUP214
TRIM25
IL1FN1
CSF2
OASL
EIF2AK2
IFIT2
HERC5
ISG20
G9E4
XAF1
IFIT3
OAS2
IFAK2
IFK7
MX1
IFITM1
ISG15
IFIT1
MX2
IFI35
OAS1
IFB
IFITM3

Gene Annotation

- Gene Symbol:
- Gene Name:
- Adjusted p value:

Functional Annotation

Enter Key Term: Search Show

Name	Hits
Cytokine Signaling in Immune system	36
Interferon alpha/beta signaling	18
Interferon Signaling	24
Immune System	66
Chemokine receptors bind chemokines	13
Peptide ligand-binding receptors	18
Class A/I (Rhodopsin-like receptors)	23
Interleukin-1 signaling	8
Cross-presentation of particulate exogenous antigens (ph	4
Toll-Like Receptors Cascades	13
GPCR ligand binding	27
Innate Immune System	31
Signaling by Interleukins	12
Interleukin-1 processing	3

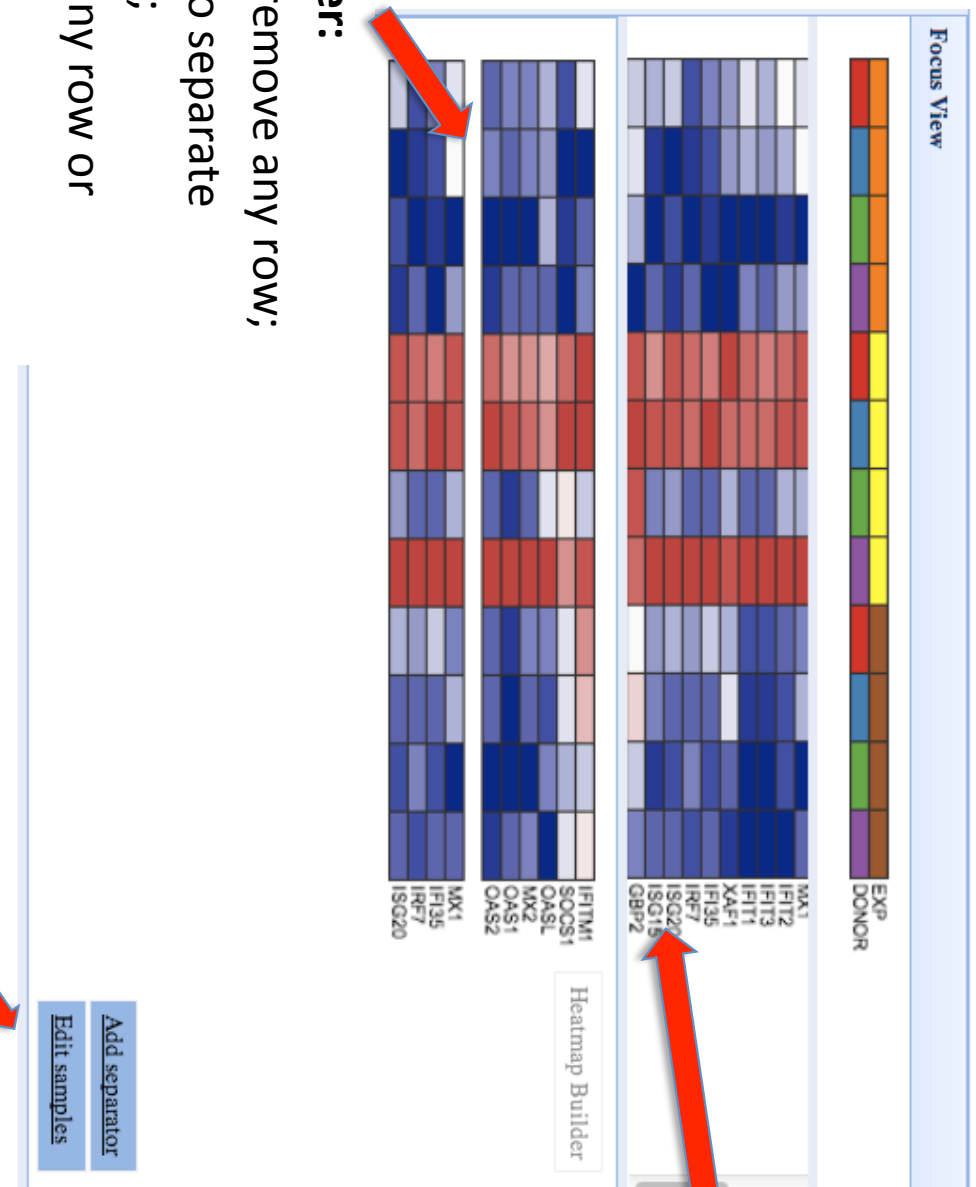
Heatmap Builder

Add separator
Edit samples

Click and drag the frame up to enlarge

Build your own heatmap!

Build a Custom Heatmap



Heatmap Builder:

Double click to remove any row;

Add separator to separate

groups of genes;

Drag and drop any row or separator!

Focus View
Double click on any row on to add to editor

Select and drag to add multiple rows to add to editor

If you want to edit samples, first make sure all genes of interest are selected and grouped, then click “Edit samples”.

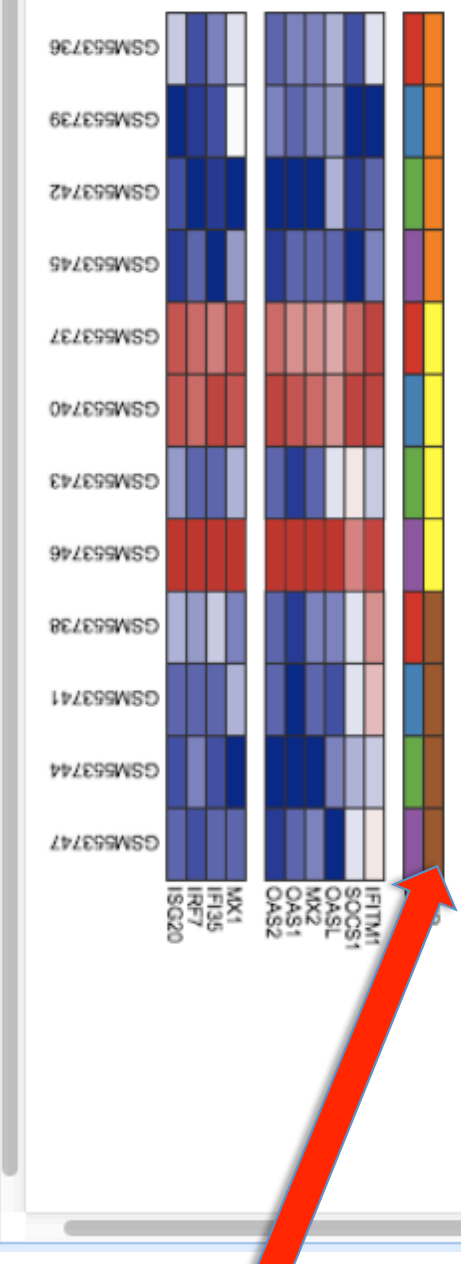
Edit Samples

Sample Editor

This should be the last step before exporting the image. All your genes of interest should be included in the heatmap below with proper resolution, colors, and clustering. Instructions:

- Remove a single sample: double clicking on the corresponding column;
- Rearrange a single sample: on the **expression heatmap**, drag-and-drop the sample to a specific location;
- Rearrange a batch of samples in two steps: 1) on the **metadata heatmap**, drag-and-select a consecutive list of samples; 2) drag the selected samples to a new location.

Export Image



Final step before image export

- Double click sample column to remove
- Drag and drop one or more samples to rearrange

Getting Images and Results

Many options for image export

Cluster genes: Adjusted P value Cluster samples: Pearson correlation Download

EXP DONOR

1L1B
1L1A
1L2A
1L2B
NFK91
MT2A
SOCS1

Download

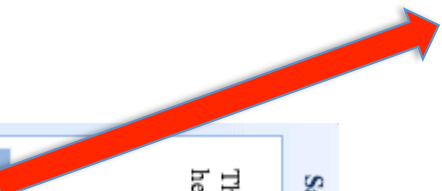
- Please Select---
- Focusview heatmap
- Overview heatmap
- Custom heatmap
- Result table
- Gene Name: nuclear receptor ir
- Adjusted p value: 0.014318
- Functional Annotation



Download result table as a zip file (significant genes and enriched functional groups)

Download Dialog

The results from data analysis and annotation can be downloaded here: [Download.zip](#)



Sample Editor

This should be the last step before heatmap below with proper resolution

- Remove a single sample: drag
- Rearrange a single sample:
- Rearrange a batch of samples of samples; 2) drag the selection

Export Image

GSM553737 GSM553745 GSM553742 GSM553739 GSM553736

=== END ===