

Analyzing pathway enrichment in Partek Pathway

Partek Pathway is a separate program from Partek Genomics Suite with a distinct user interface (Figure 1).

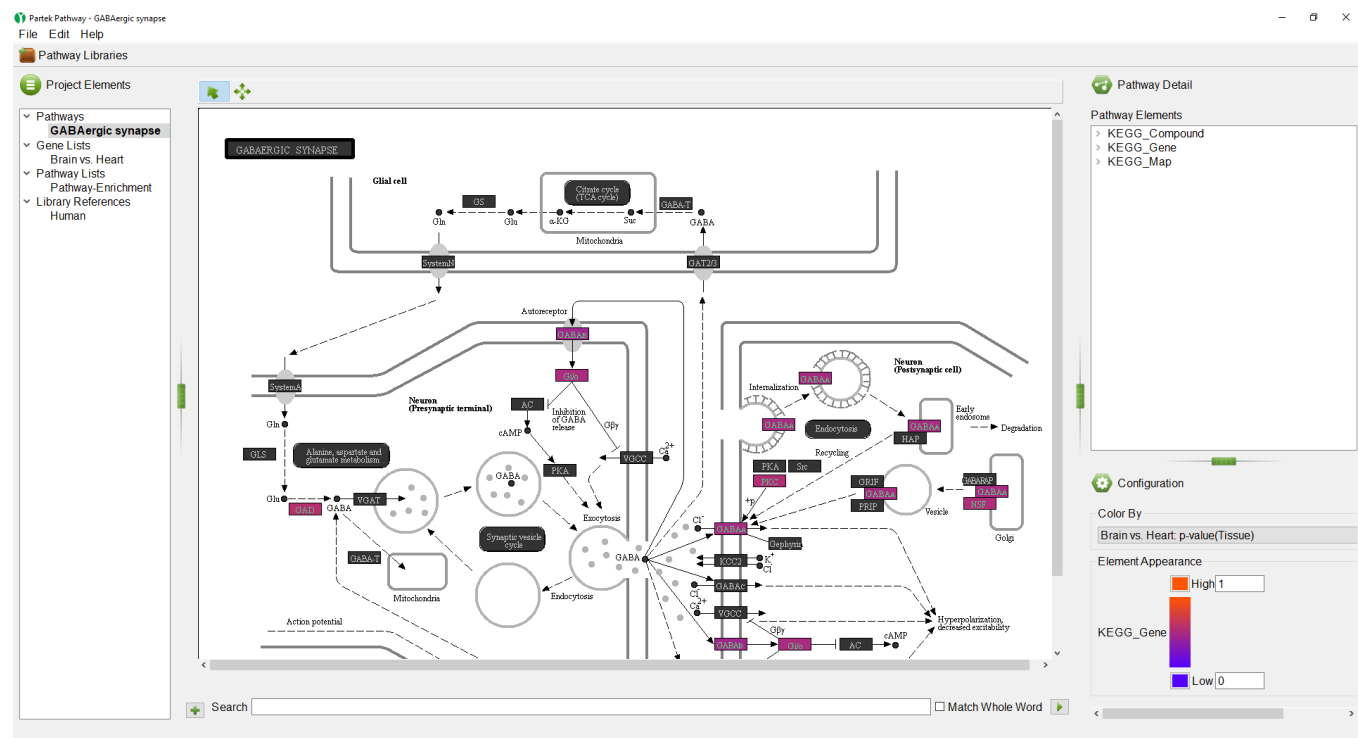


Figure 15. Partek Pathway

The *Project Elements* panel (Figure 2) displays the selected pathway, the original gene list, the Pathway Enrichment spreadsheet, and the library references that were used for the pathway analysis. The *Project Elements* panel is used to navigate between open pathway diagrams and spreadsheets.

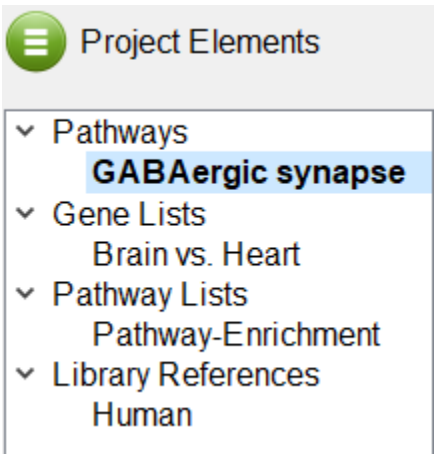


Figure 16. Project Elements panel

- Select the **Brain vs. Heart** spreadsheet under *Gene Lists*

The *Brain vs. Heart* gene list we created earlier will open (Figure 3). The spreadsheet can be sorted by any column by left-clicking a column header; the first click will sort by ascending values, the second click will switch to descending values.

Partek Pathway - Marker List

File Edit Help

Pathway Libraries

Project Elements

- Pathways
 - GABAergic synapse
 - Gene Lists
 - Brain vs. Heart
 - Pathway Lists
 - Pathway-Enrichment
 - Library References
 - Human

Gene Symbol	Column #	Probeset ID	gene_assignment	RefSeq	Fold-Change	p-value(Tissue)	p-value(Replic)	p-value(Brain)	Ratio(Brain v	Fold-Change	F(Tissue)	F(Replicate)	F(Error)
SERPINI1	18661	8083779	NM_0011...	NM_0011...	Brain up v...	2.80113e-06	0.00048932	2.80113e-06	34.1381	34.1381	356998	2042.85	1
CHCHD3	24797	8143028	NM_0178...	NM_017812	Brain dow...	2.99382e-06	0.0005269...	2.99382e-06	0.196247	-5.09563	334020	1896.7	1
IQSEC2	28050	8172858	NM_0011...	NM_0011...	Brain up v...	7.90025e-06	0.0008706...	7.90025e-06	3.19735	3.19735	126577	1147.56	1
TSGA10	15753	8054166	NM_0252...	NM_025244	Brain up v...	7.94332e-06	0.0001300...	7.94332e-06	2.00348	2.00348	125890	7688.39	1
CREBL2	5829	7954021	NM_0013...	NM_001310	Brain up v...	8.70452e-06	3.38042e-05	8.70452e-06	2.07751	2.07751	114881	29581.1	1
FGF14	7612	7972650	NM_1759...	NM_175929	Brain up v...	9.72431e-06	0.0205134	9.72431e-06	12.3537	12.3537	102834	47.7486	1
KIAA0748	6755	7963851	NM_0010...	NM_0010...	Brain up v...	9.73882e-06	0.0134063	9.73882e-06	27.6273	27.6273	102680	73.5918	1
MAST3	12976	8026926	NM_0150...	NM_015016	Brain up v...	1.34738e-05	0.00540722	1.34738e-05	11.9606	11.9606	74216.5	183.938	1
DPP10	14813	8044700	NM_0208...	NM_020868	Brain up v...	2.14631e-05	0.00861575	2.14631e-05	35.1274	35.1274	46590.1	115.066	1
DCHS2	20635	8103260	NM_0176...	NM_017639	Brain up v...	2.27356e-05	0.00398937	2.27356e-05	2.89253	2.89253	43982.5	249.666	1
PALM	12702	8024003	NM_0025...	NM_002579	Brain up v...	2.28249e-05	0.00878101	2.28249e-05	2.04898	2.04898	43810.4	112.882	1
C8orf34	25212	8146839	BC04196...	BC041961	Brain up v...	2.53926e-05	0.102525	2.53926e-05	2.56046	2.56046	39380.1	8.75376	1
CARS2	7636	7972810	NM_0245...	NM_024537	Brain dow...	3.04141e-05	0.00228575	3.04141e-05	0.481994	-2.07471	32678	436.494	1
FAM60A	6595	7962146	NM_0212...	NM_021238	Brain dow...	3.08522e-05	0.0004199...	3.08522e-05	0.225215	-4.44021	32411.1	2380.04	1
ATP6V1G2	22949	8124942	NM_1304...	NM_130463	Brain up v...	3.31027e-05	0.0262198	3.31027e-05	27.7308	27.7308	30207.5	37.1391	1
ATP6V1G2	28852	8179762	NM_1304...	NM_130463	Brain up v...	3.31027e-05	0.0262198	3.31027e-05	27.7308	27.7308	30207.5	37.1391	1
C3orf64	19104	8086880	NM_1736...	NM_173654	Brain dow...	3.37617e-05	0.0140954	3.37617e-05	0.245414	-4.07475	29617.9	69.945	1
NEFL	25568	8149835	NM_0061...	NM_006158	Brain up v...	3.51341e-05	0.0878165	3.51341e-05	87.2386	87.2386	28460.9	10.3874	1
THBS1	8720	7982597	NM_0032...	NM_003246	Brain dow...	3.55451e-05	0.0003650...	3.55451e-05	0.0401849	-24.885	28131.7	2738	1
SYN2	18092	8077879	NM_1336...	NM_133625	Brain up v...	3.65178e-05	0.151787	3.65178e-05	14.4779	14.4779	27382.4	5.58817	1
ZNF540	13121	8028266	NM_1526...	NM_152606	Brain up v...	3.89471e-05	0.0016508	3.89471e-05	5.07428	5.07428	25674.4	604.765	1
ELOVL4	23211	8127767	NM_0227...	NM_022726	Brain up v...	4.35983e-05	0.0265802	4.35983e-05	13.9471	13.9471	22935.2	36.6221	1
GMS2L2	24536	8140269	AB01700...	AB017005	Brain up v...	4.37467e-05	0.0301385	4.37467e-05	4.49468	4.49468	22857.4	32.1801	1
PMP6B	27896	8171359	NM_0010...	NM_0010...	Brain up v...	4.38444e-05	0.110366	4.38444e-05	39.8391	39.8391	22806.4	8.06078	1
KIF5C	14941	8045637	NM_0045...	NM_004522	Brain up v...	4.50114e-05	0.0278873	4.50114e-05	53.217	53.217	22215.1	34.8586	1
TIAM1	17289	8069880	NM_0032...	NM_003253	Brain up v...	4.74943e-05	0.00409289	4.74943e-05	5.25581	5.25581	21053.7	243.326	1
PARC	22372	8119722	NM_0150...	NM_015089	Brain up v...	4.87149e-05	0.00370581	4.87149e-05	2.1608	2.1608	20526.1	268.846	1
MRP1_53	15637	8053165	NM_0530...	NM_053050	Brain dow...	4.91247e-05	0.00394222	4.91247e-05	0.387291	-2.58204	20354.8	249.362	1

Search ☐ Match Whole Word

Figure 17. Viewing a gene list in Partek Pathway

- Select the **Pathway-Enrichment** spreadsheet under *Pathway Lists*

The *Pathway-Enrichment.txt* spreadsheet will open (Figure 4). This spreadsheet has the same contents as the *Pathway-Enrichment.txt* spreadsheet in Partek Genomics Suite. Selecting any of the pathway names will open its pathway diagram. The spreadsheet can be sorted by any column.

Partek Pathway - Pathway List

File Edit Help

Pathway Libraries

Project Elements

- Pathways
 - GABAergic synapse
 - Gene Lists
 - Brain vs. Heart
 - Pathway Lists
 - Pathway-Enrichment**
 - Library References
 - Human

Pathway Name	Database	Pathway ID	Enrichment S	Enrichment p	% genes in p	Tissue score	Replicate sc	Brain vs. Heart	# genes in list	# genes not in	# genes in list	# genes not in
GABAergic synapse	kegg	kegg_path...	18.5485	8.79991e-09	15.9091	3.32415	0.711747	3.32415	14	74	149	6909
Nicotinic acetylcholine receptor	kegg	kegg_path...	18.113	1.36022e-08	25	3.33282	0.51346	3.33282	10	30	153	6953
Morphine addiction	kegg	kegg_path...	15.9773	1.15117e-07	14.2857	3.33875	0.725444	3.33875	13	78	150	6905
Retrograde endocannabinoid signaling	kegg	kegg_path...	11.9984	6.15432e-06	9.45946	3.30376	0.774961	3.30376	14	134	149	6849
Synaptic vesicle cycling	kegg	kegg_path...	11.2819	1.25985e-05	14.0625	3.65266	0.821323	3.65266	9	55	154	6928
Neuroactive ligand-receptor interaction	kegg	kegg_path...	11.011	1.65197e-05	6.83453	3.37986	0.679422	3.37986	19	259	144	6724
Ras signaling	kegg	kegg_path...	8.63564	0.00017766	6.66667	3.63383	1.36285	3.63383	15	210	148	6773
Long-term potentiation	kegg	kegg_path...	7.15903	0.0007778...	10.4478	3.18603	0.65542	3.18603	7	60	156	6923
Calcium signaling	kegg	kegg_path...	7.033	0.0008822...	6.59341	3.30149	0.703896	3.30149	12	170	151	6813
Dilated cardiomyopathy	kegg	kegg_path...	6.92994	0.0009780...	8.88889	3.4795	0.420761	3.4795	8	82	155	6901
Adrenergic signaling	kegg	kegg_path...	6.43294	0.00160771	6.94444	3.448	0.469437	3.448	10	134	153	6849
Focal adhesion	kegg	kegg_path...	6.3055	0.00182623	6.06061	3.53304	0.984251	3.53304	12	186	151	6797
Hypertrophic cardiomyopathy	kegg	kegg_path...	5.89985	0.00273986	8.43373	3.52792	0.394031	3.52792	7	76	156	6907
Amphetamine addiction	kegg	kegg_path...	5.43165	0.00437589	8.82353	3.22463	0.617427	3.22463	6	62	157	6921
cAMP signaling	kegg	kegg_path...	5.21087	0.0054569	5.55556	3.46593	0.93421	3.46593	11	187	152	6796
Amyotrophic lateral sclerosis	kegg	kegg_path...	5.14106	0.00585148	9.80392	3.6008	0.712386	3.6008	5	46	158	6937
Vascular smooth muscle contraction	kegg	kegg_path...	5.12173	0.00596569	6.66667	3.19604	0.911367	3.19604	8	112	155	6871
Glycerophospholipid metabolism	kegg	kegg_path...	5.03523	0.00650468	7.21649	3.471	1.10778	3.471	7	90	156	6893
Phosphatidylcholine metabolism	kegg	kegg_path...	4.92554	0.00725884	7.07071	3.33572	0.881325	3.33572	7	92	156	6891
Alanine aspartate aminotransferase	kegg	kegg_path...	4.84399	0.00787556	11.4286	3.12884	0.732108	3.12884	4	31	159	6952
Cardiac muscle contraction	kegg	kegg_path...	4.76461	0.00852618	7.69231	3.5907	0.351563	3.5907	6	72	157	6911
Dopamine metabolism	kegg	kegg_path...	4.65343	0.00952889	6.15385	3.37473	0.809708	3.37473	8	122	155	6861
Taste transduction	kegg	kegg_path...	4.58634	0.0101901	7.40741	3.33998	0.599659	3.33998	6	75	157	6908
Long-term depression	kegg	kegg_path...	4.3934	0.0123587	8.19672	3.28333	0.861269	3.28333	5	56	158	6927
Glutamate receptor signaling	kegg	kegg_path...	4.19114	0.0151291	6.14035	3.25163	0.700265	3.25163	7	107	156	6876
Circadian entrainment	kegg	kegg_path...	3.81383	0.0220636	6.25	3.20811	0.841977	3.20811	6	90	157	6893
MAPK signaling	kegg	kegg_path...	3.52	0.0295994	4.34783	3.64212	1.15544	3.64212	11	242	152	6741
cGMP-PKG signaling	kegg	kegg_path...	3.45563	0.0315675	4.93827	3.14424	0.717185	3.14424	8	154	155	6829

Search ☐ Match Whole Word

Figure 18. Viewing the Pathway Enrichment spreadsheet in Partek Pathway

- Select the **GABAergic synapse** pathway on the *Pathway-Enrichment* spreadsheet or the Project Elements panel

The *GABAergic synapse* pathway diagram will open. Genes in the pathway are shown as boxes. The color of the boxes is set by the *Configuration* panel (Figure 5).

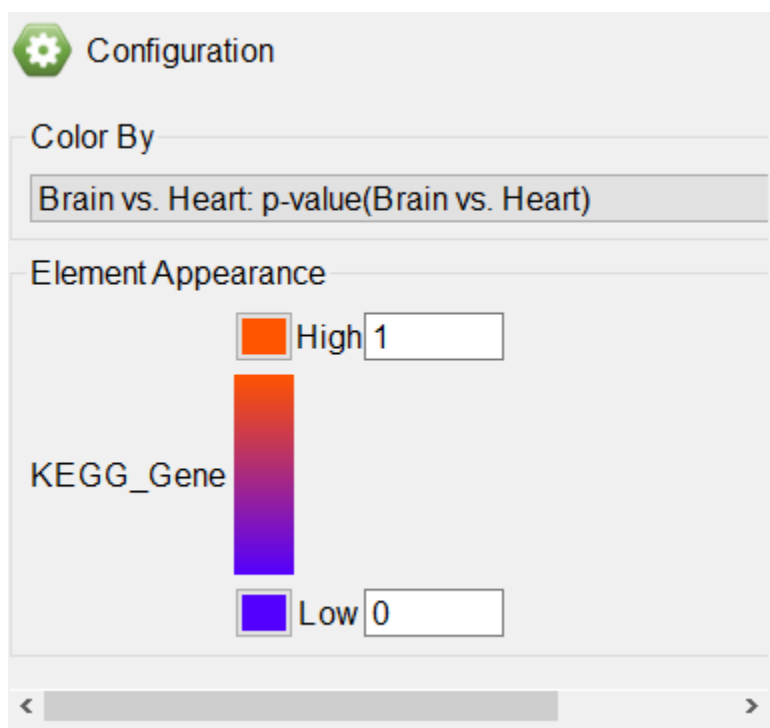


Figure 19. The Configuration panel

Any numerical column from the source gene list can be used to color the gene boxes. While significant p-values indicate a difference between the categories, they give no information about upregulation or downregulation of the pathway. We can overlay fold-change information on the pathway diagram.

- Select **Brain vs. Heart: Fold-Change(Brain vs. Heart)** from the drop-down menu

The pathway diagram now shows fold change for each gene in the pathway included in the gene list (Figure 6). Genes not in the gene list remain black.

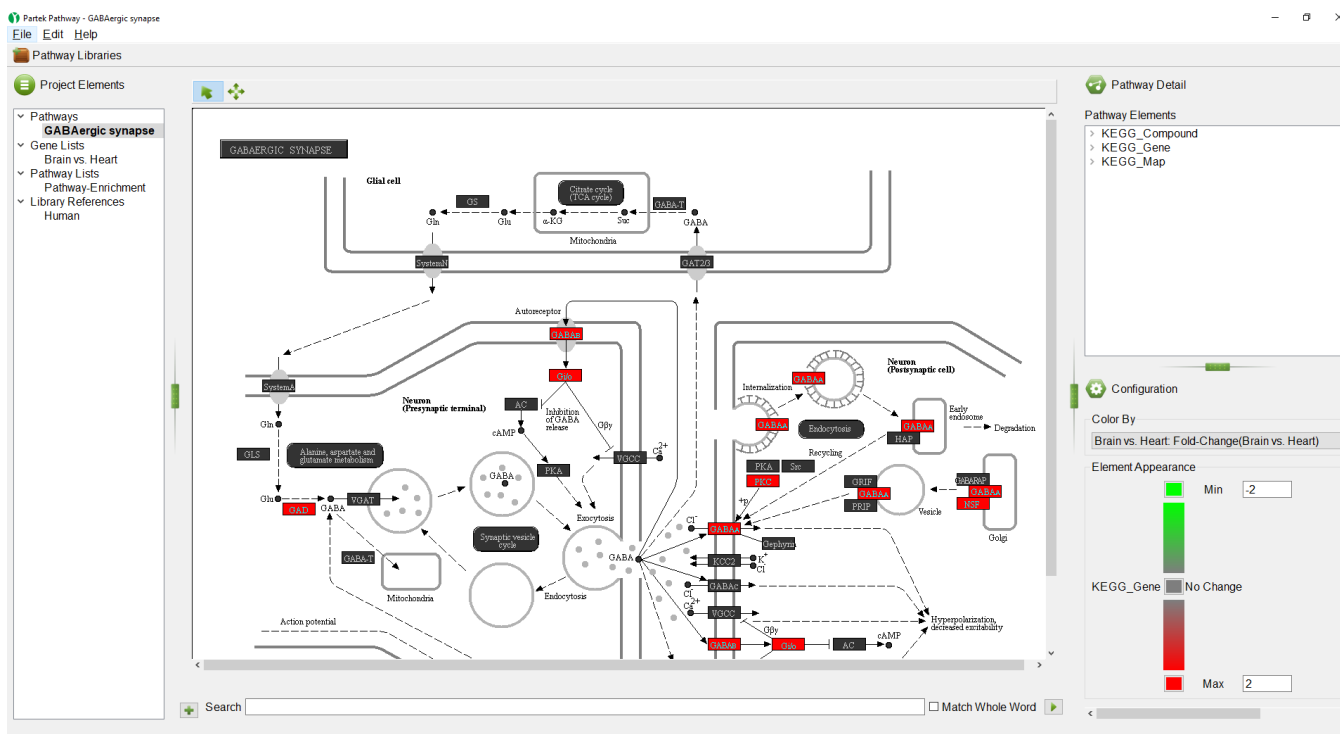


Figure 20. GABAergic synapse pathway diagram showing fold-changes for genes in the gene list

The colors and range of can be changed using the *Color By* panel.

- Select the red color square next to *Max*
- Select yellow from the color picker interface
- Select **OK**
- Select the green color square next to *Min*
- Select pale blue from the color picker interface
- Select **OK**

We can see that all the colored genes in the *GABAergic synapse* pathway are yellow (Figure 7), indicating that they are up-regulated.

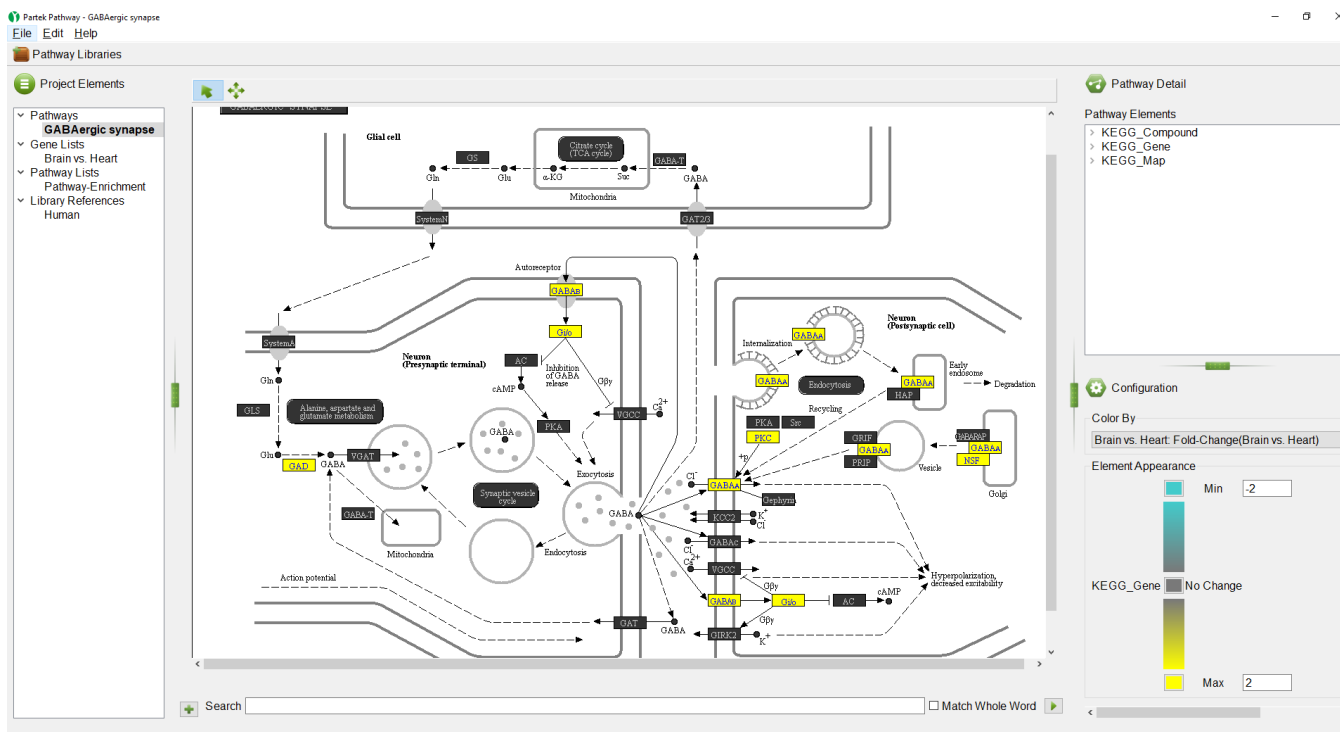


Figure 21. Changing colors in the Pathway Diagram; up-regulated genes are yellow and down-regulated genes are teal

We can select a gene to learn more about it.

- Select (🖱️) to activate Selection Mode
- Right-click *GABRG1* (Figure 8)

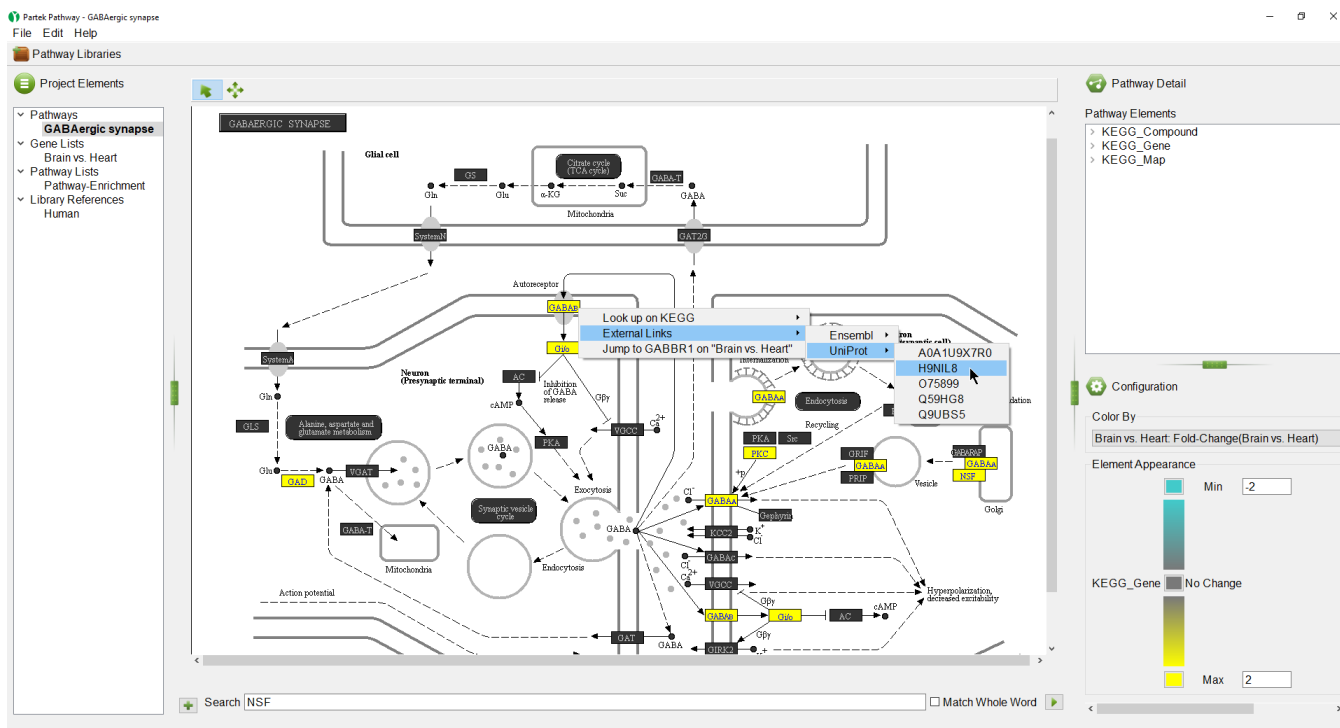


Figure 22. Learn more about any gene on a pathway diagram by right-clicking


Options available include:

Look up on KEGG - opens the KEGG page for the pathway on GenomeNet (genome.jp) in your web browser



Ensembl - under *External Links*, opens the page for the selected Ensembl ID on ensemble.org

UniProt - under *External Links*, opens the page for the selected UniProt ID on uniprot.org

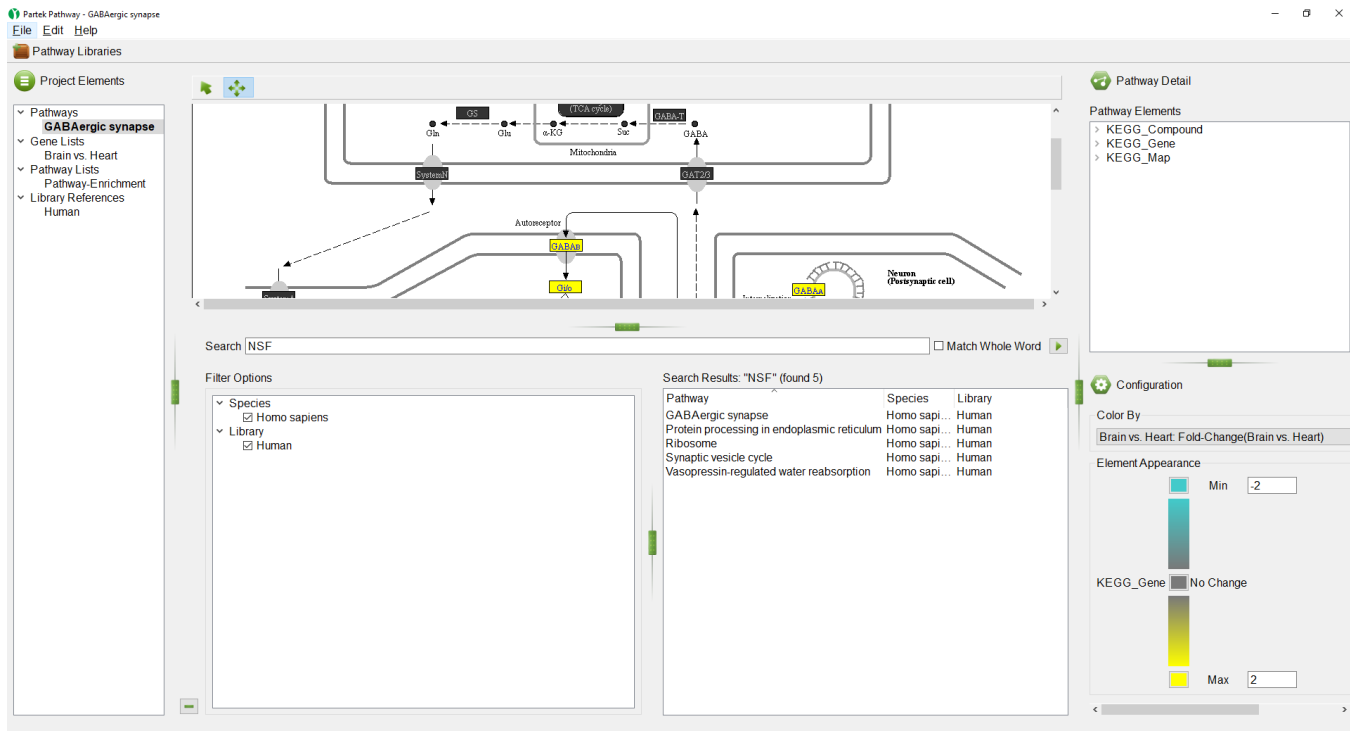
Jump to ___ on "___" - opens the source gene list in Partek Pathway to the row of the selected gene

Selecting () activates Navigation Mode. This enables navigation on large pathway diagrams by left-clicking and dragging to move the view.

The pathway database can be searched for genes of interest using the *Search* panel.

- Select () to open the search panel
- Type **NSF** in the search box
- Select () to search

Pathways containing NSF appear on the right-hand side in the Search Results section in alphabetical order (Figure 9).



The screenshot displays the Partek Pathway software interface. The main window shows a pathway diagram of the GABAergic synapse. On the left, the 'Project Elements' panel lists various categories like Pathways, Gene Lists, and Pathway Lists. The 'Search' panel is active, showing a search box with 'NSF' and a 'Match Whole Word' checkbox. Below the search box, the 'Filter Options' section allows filtering by Species (Homo sapiens, Human) and Library. The 'Search Results: "NSF" (found 5)' section lists five pathways: GABAergic synapse, Protein processing in endoplasmic reticulum, Ribosome, Synaptic vesicle cycle, and Vasopressin-regulated water reabsorption. The 'Synaptic vesicle cycle' pathway is highlighted. On the right, the 'Pathway Detail' panel shows the selected pathway's elements (KEGG_Compound, KEGG_Gene, KEGG_Map) and the 'Configuration' panel shows color and element appearance settings.

Figure 23. Using the search panel to find pathways containing a gene of interest

If multiple species or libraries have been loaded, the Filter Options section on the left-hand side can be used to choose which species and libraries to search.

- Double click on **Synaptic vesicle cycle** in the Search Results section

The selected pathway, Synaptic vesicle cycle, will open in the *Pathway Diagram* panel (Figure 10).

- Select () to minimize the *Search* panel

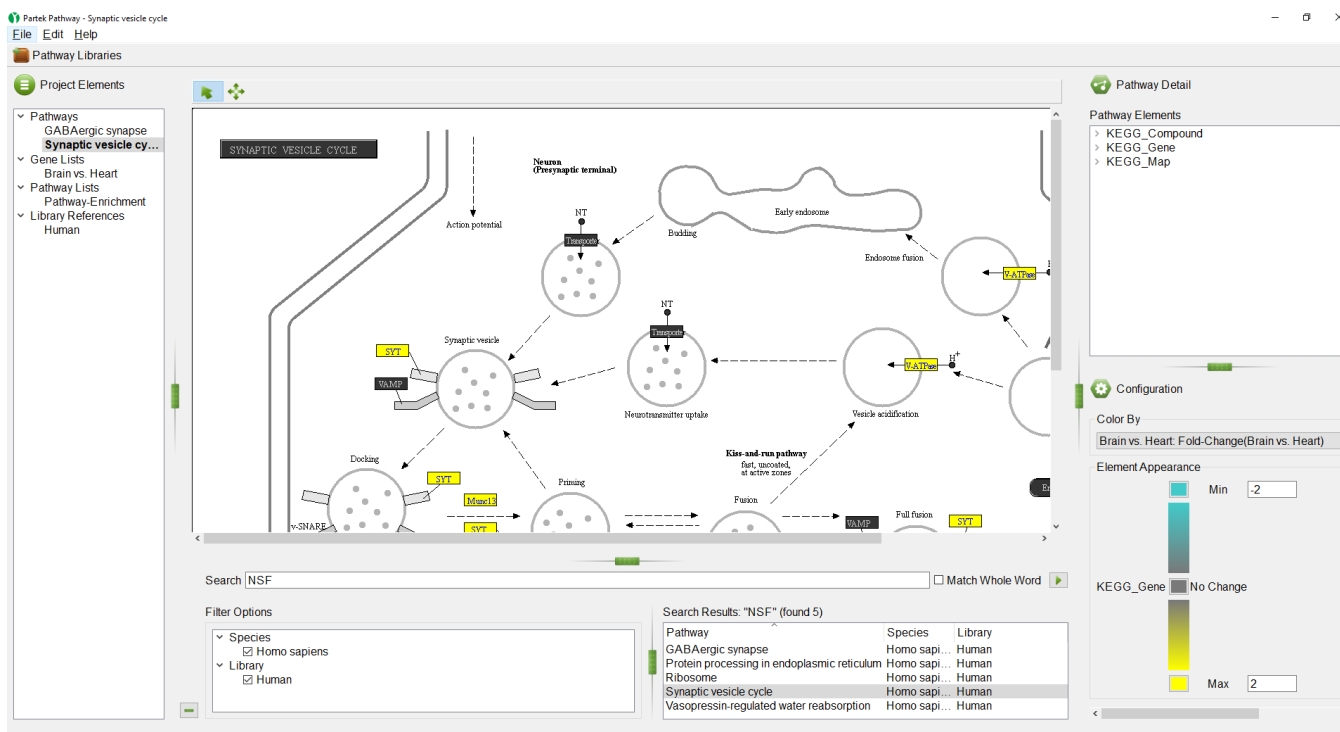


Figure 24. Opening a pathway diagram from search results

On the right-hand side of the Partek Pathway window, we see the *Pathway Detail* panel (Figure 11).

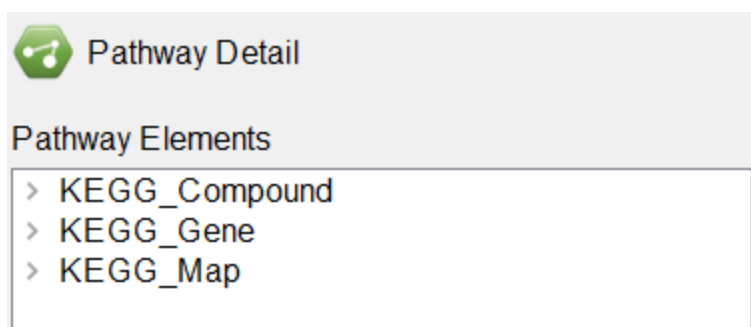


Figure 25. The Pathway Detail panel

- Select **KEGG_Gene** to open the list of genes in the pathway

Selecting a gene in the list will highlight it in the pathway diagram (Figure 12).

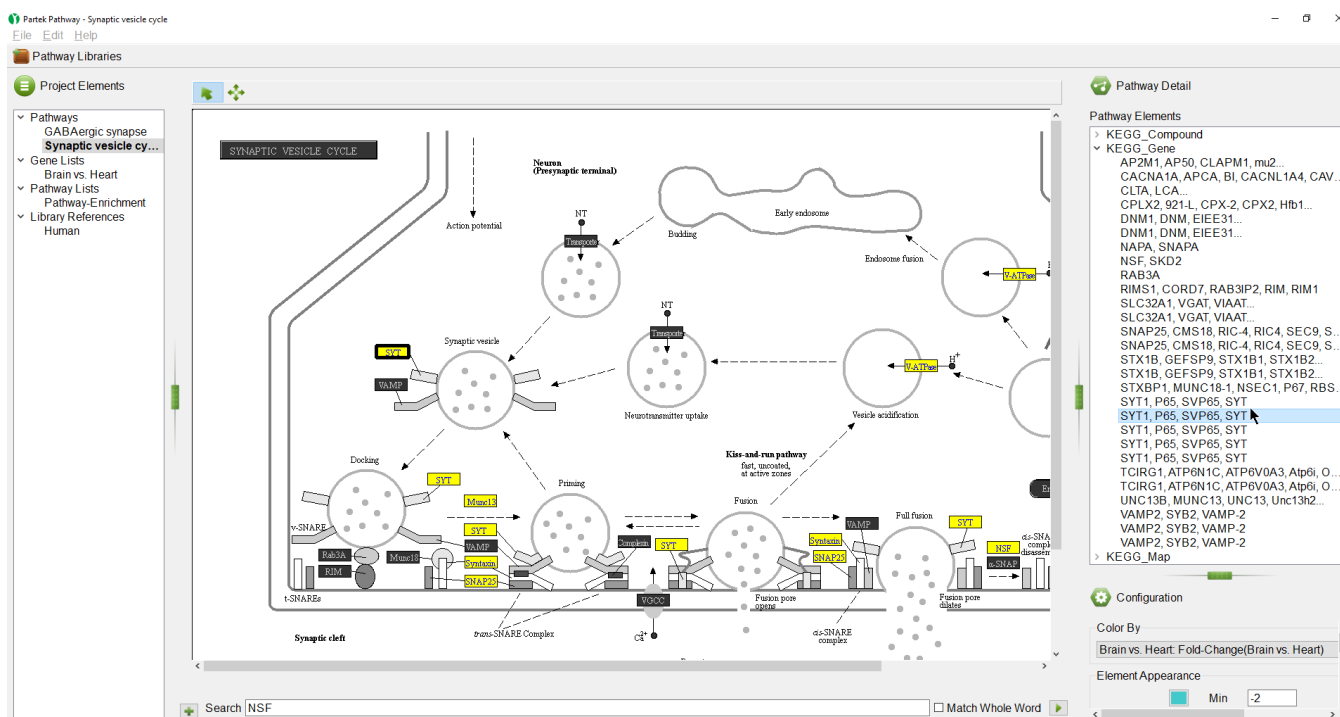



Figure 26. Selecting a gene in a pathway diagram using the Pathway Detail panel

Another way to select and view a pathway is browsing the Pathway Libraries.

- Select () in the upper left-hand corner of the Partek Pathway window

The *Pathway Libraries* dialog will open (Figure 13).

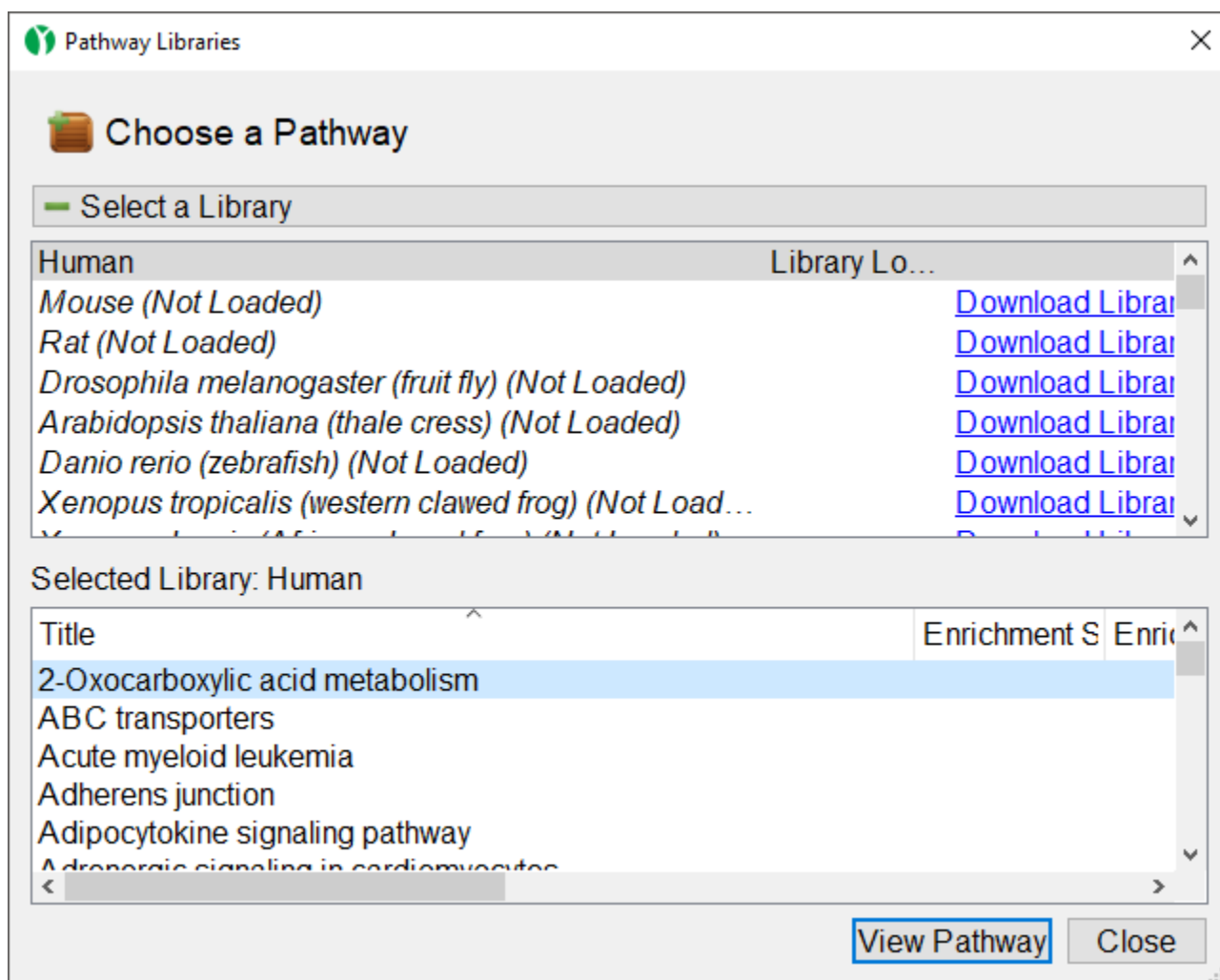


Figure 27. Downloading and browsing pathway libraries

In the upper section of the dialog, you can view available KEGG libraries and download them by selecting the *Download Library* link. Selecting a pathway opens it in the lower section of the dialog.

In the lower section of the dialog, you can view a list of all the pathways in the selected pathway library. You can also open any pathway from the selected library in the *Pathway Diagram* panel.

- Select **Adherens Junction**
- Select **View Pathway** to open the pathway diagram

We can use the *Project Elements* panel to close an open pathway diagram or list.

- Right-click **Adherens Junction** in the *Project Elements* panel
- Select Delete from the pop-up menu to close the diagram (Figure 14)

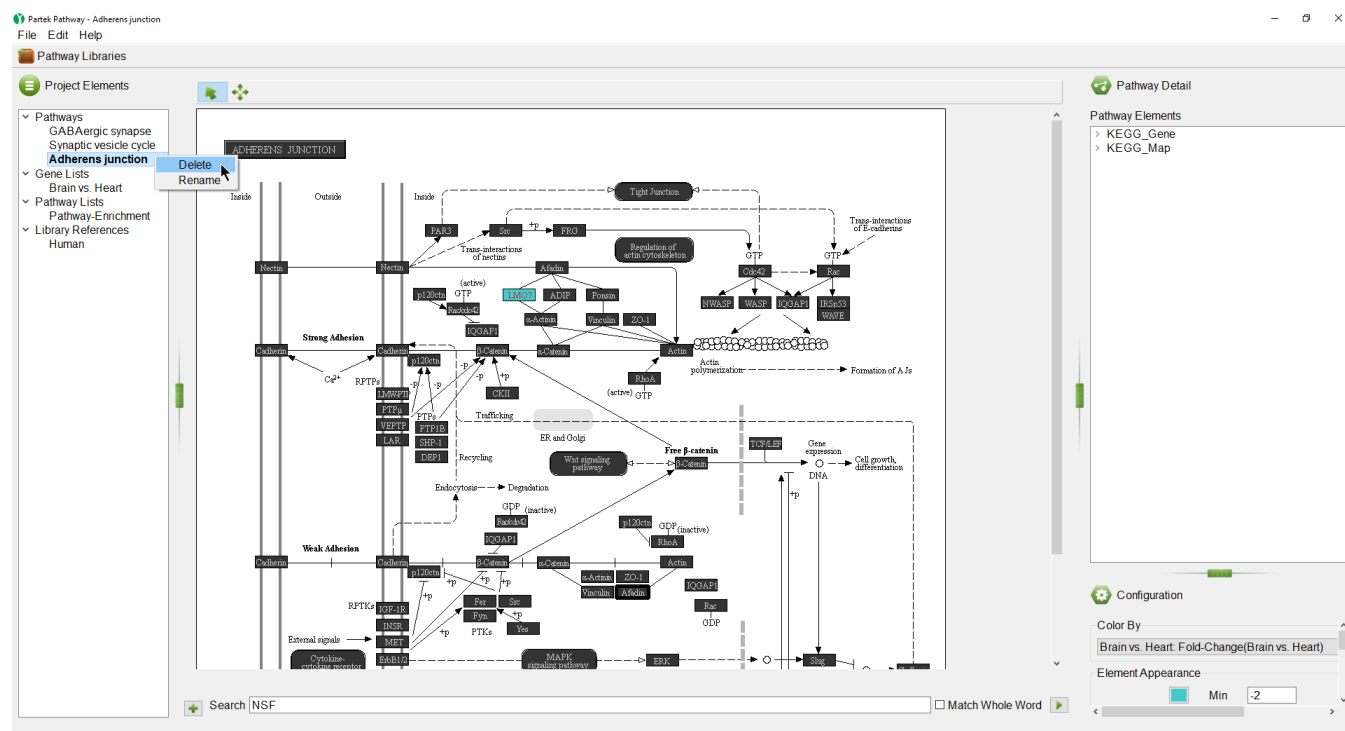


Figure 28. Closing a pathway diagram

The *Search* panel and *Pathway Libraries* can also be used to open pathway diagrams for pathways without any open gene or pathway lists.

Additional Assistance

If you need additional assistance, please visit [our support page](#) to submit a help ticket or find phone numbers for regional support.



Your Rating:      Results:      40 rates