ToxProfiler

Version 1.1 (March 2021)

ToxProfiler is a web-based tool that predicts the potential of a chemical to interact with 64 toxicity targets. Users can upload their own query chemicals which will be screened for the ability to interact with 64 toxicity targets. In short, this tool provides an *in silico* safety screen for chemicals.

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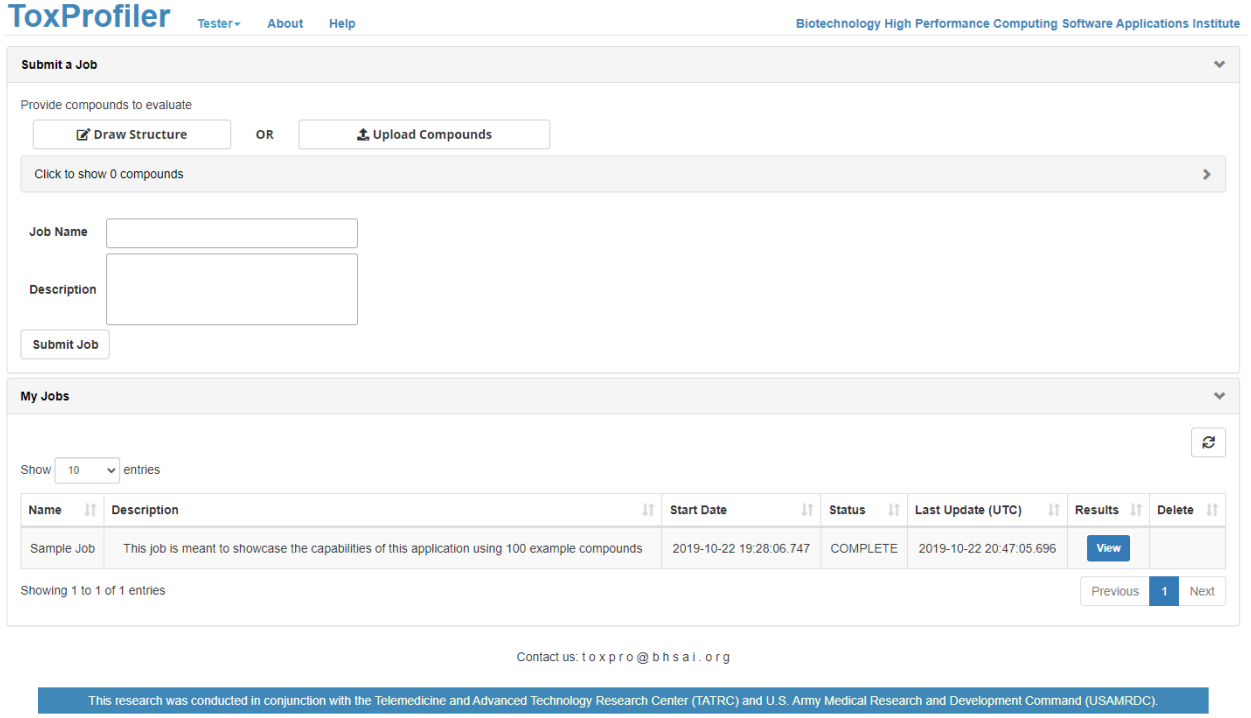
User Guide

Dashboard

When you log in to ToxProfiler, you will be taken to the dashboard page. A screenshot of the dashboard is shown below.



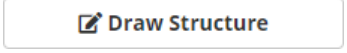
Dashboard view

The dashboard is divided into two main panels. The top panel is used to enter compounds and submit jobs while the bottom panel is used to track and view jobs you have already submitted.

Submitting a Job

To submit a job, you must first enter the compounds to be assessed. This can be done either by drawing compound structures manually or by uploading them from a file.

Drawing Compound Structures

To start drawing compounds, click the  button. This will bring up a new dialog window with the compound drawing controls.

Structure drawing dialog

Inside the dialog, you can use the various elements and structures to build a compound. The SMILES text will update to reflect the changes as you go. When you are done, you can give the compound a name and add it to your job by clicking Add Compound

Uploading Compounds

To upload compounds from a file, click the Upload Compounds button. A list of requirements for the input file are given below.

- The file must be in CSV (Comma Separated) format
- The first column must contain the compound names
- The second column must contain the canonical SMILES
- The first row is expected to contain column headers and is therefore ignored

	A	B
1	Compound Name	SMILES
2	#1	CC1=C(C(C(=C(N1)C)C(=O)OC)C2=CC=CC=C2[N+](=O)[O-])C(=O)OC
3	#2	CS(=O)(=O)C1=CC=C(C=C1)C2=C(C(=O)OC2)C3=CC=CC=C3
4		

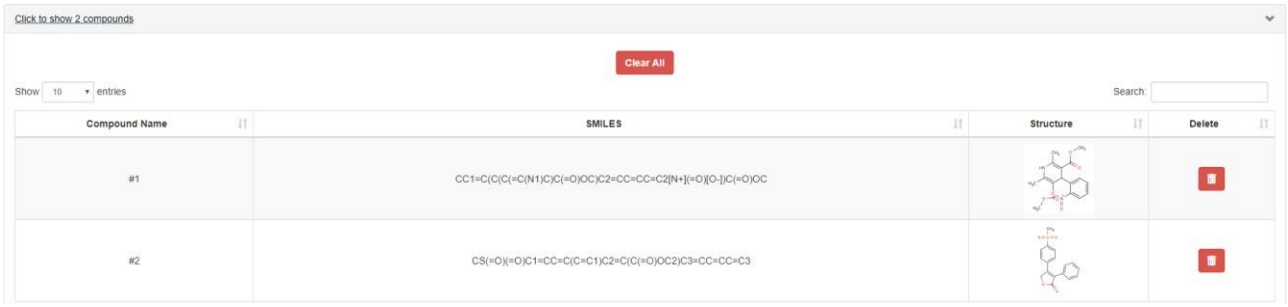
Example file edited in Excel

```
1  Compound Name,SMILES
2  #1,CC1=C(C(C(=C(N1)C)C(=O)OC)C2=CC=CC=C2[N+](=O)[O-])C(=O)OC
3  #2,CS(=O)(=O)C1=CC=C(C=C1)C2=C(C(=O)OC2)C3=CC=CC=C3
```

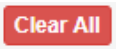
Example file edited as plain text

Viewing Compounds

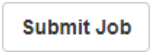
To view the list of compounds you have provided, click the panel header that says “Click to show **X** compounds” (where X is the current number of input compounds).



Expanded compound panel

You can remove individual compounds by clicking their  or clear the entire list by clicking the  button at the top of the panel.

Submitting Jobs

When all of your compounds are entered, you can give the job a name and queue it for execution by clicking  . The job should then appear in the lower panel entitled “My Jobs” along with its current status.

Viewing Job Results

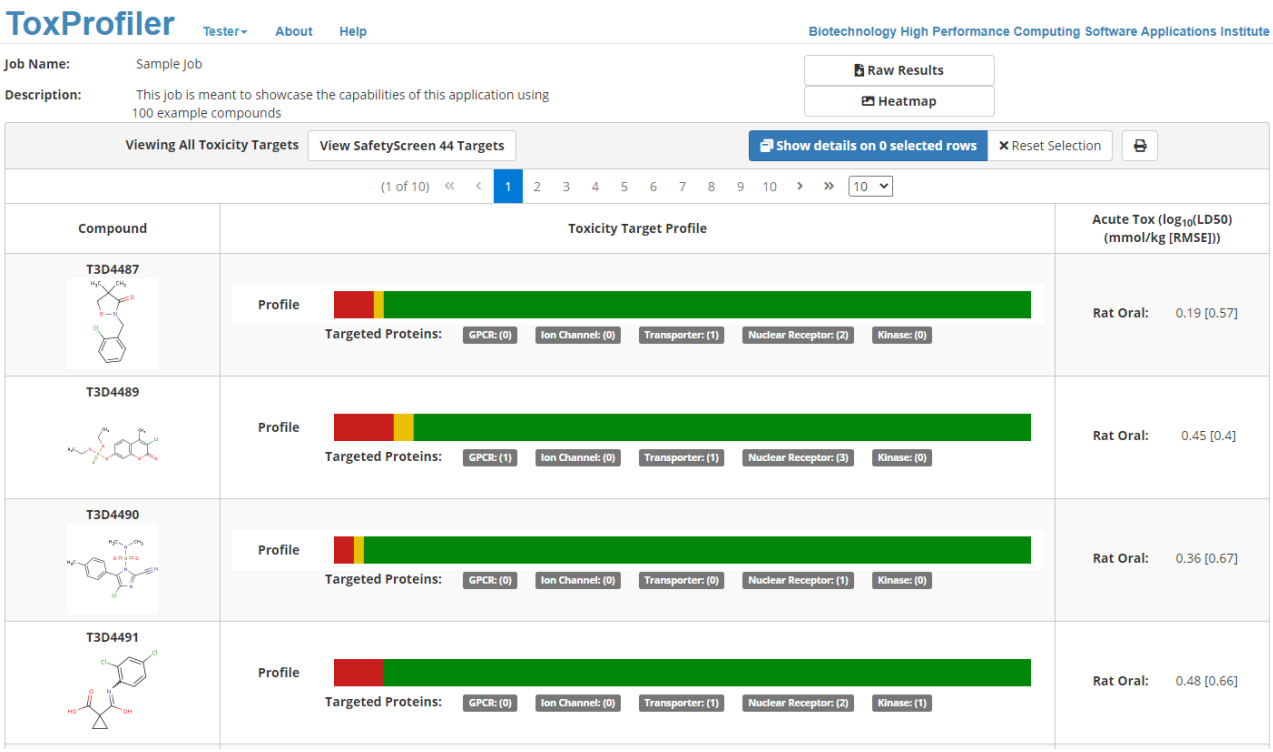
When a job is finished executing, you can view its results by clicking the  button in the job’s row in the “My Jobs” table. This button only appears when a job finishes successfully.

Results

Notes on Color Coding

Several views of a job’s results use color codes to express the predicted toxicity of a compound. These colors are determined by the numerical predictions generated by the ToxProfiler model. The mappings between predictions and their corresponding color codes are given in the table below.

Prediction	Meaning	Color
Score < 1.645	This compound is not predicted to be toxic to the target protein	Green
1.645<= Score < 1.96	This compound is potentially toxic to the target protein	Yellow
Score > 1.96	This compound is predicted to be toxic to the target protein	Red



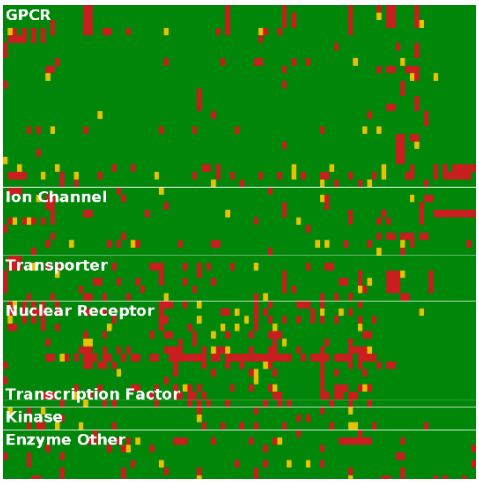
The results page

Raw Results

The raw results of the job in the form of a tab separated table where each cell is a compound's prediction for one target protein can be downloaded by clicking the Raw Results button.

Heatmap

A concise graphical summary of the job in the form of a heatmap can be viewed and downloaded by clicking the Heatmap button. The heatmap shows a grid in which each cell represents the color coded prediction from one compound to a target protein.



Example heatmap

Switching Views

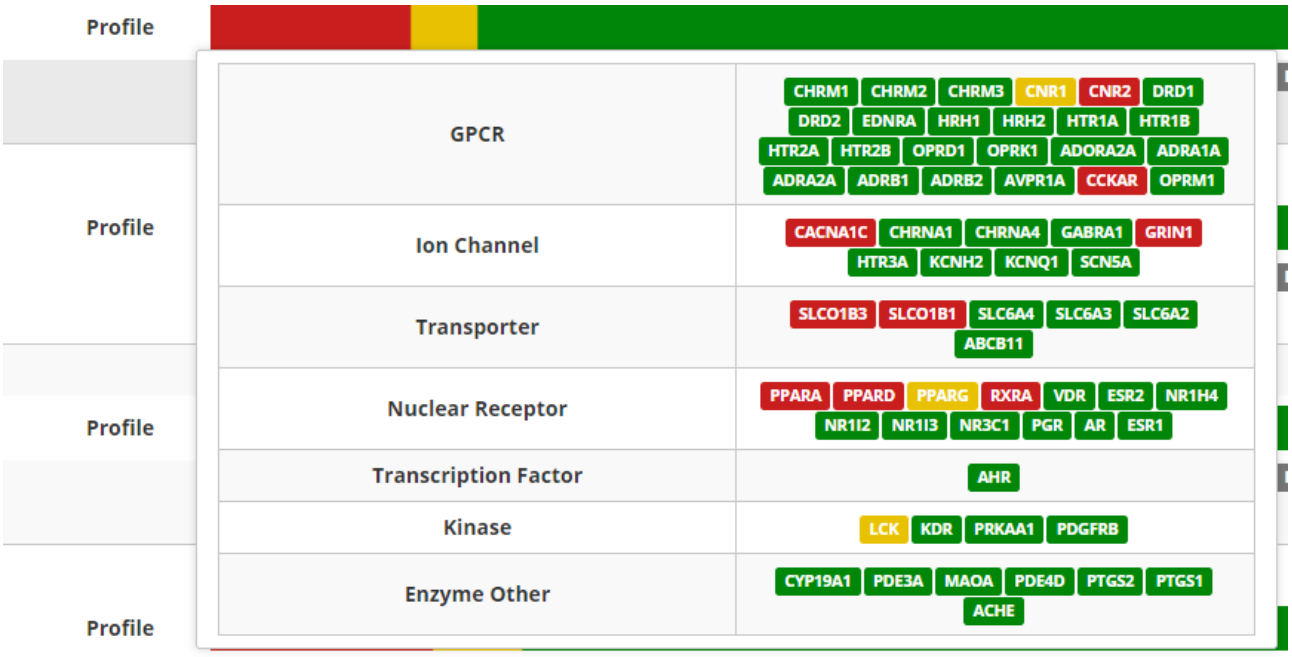
By default, results are shown for all 64 toxicity target proteins used by the ToxProfiler model. To view results from only the SafetyScreen 44 proteins, click the View SafetyScreen 44 Targets button in the table header. If you have selected the SafetyScreen 44 view, a similar button will appear to navigate back to all toxicity targets.

Single Compound Summaries

Each row of the results table summarizes the results from one compound. The centerpiece of this summary is the Toxicity Target Profile graphic, which briefly shows the proportion of target proteins that belonged to each color category for that compound.

Example profile summary

Hovering the mouse over one of these summary graphics will present a more detailed summary that shows which individual proteins were targeted.



Example detailed summary

Exporting the Table

Clicking the button allows you to print the table or export it as a PDF

Selecting Rows

Clicking in the blank space of a row in the table will select the row. Multiple rows can be selected by Ctrl clicking or Shift clicking. A selected row can be deselected by Ctrl clicking it or all selected rows can be deselected by clicking the ✕ Reset Selection button.

When you have selected all rows of interest, you can view detailed results on the rows in a dialog by clicking the 

button. In this case, 3 rows are selected.

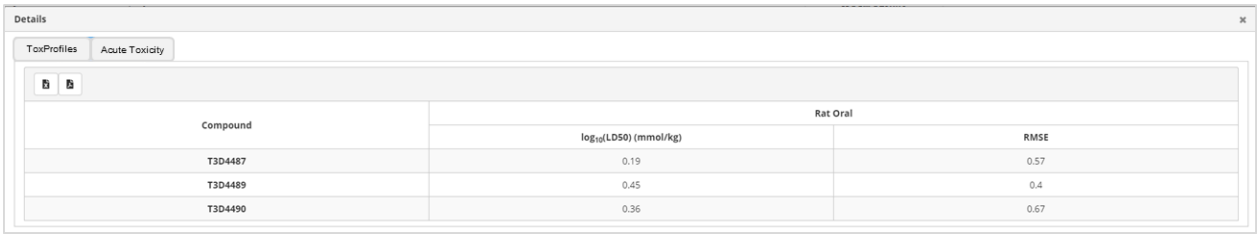
The Details Dialog

Example details dialog

The details dialog shows the numerical prediction generated by the ToxProfiler model for each pairing of protein with selected compounds. Clicking the hyperlink for a protein opens that protein's entry in the UniProt database in a new tab.

Clicking the 

tab in the details dialog shows detailed Acute Toxicity predictions.



Acute Toxicity details

The contents of either table can be exported to Excel using the  button or to PDF using the  button.