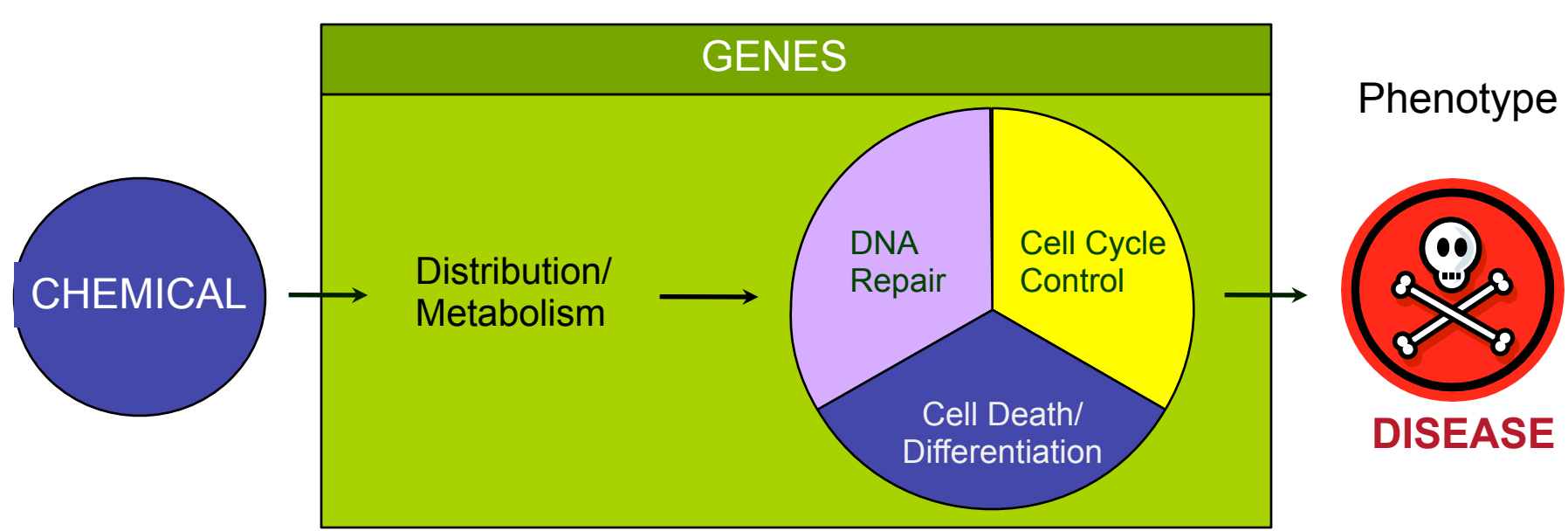


The Comparative Toxicogenomics Database: connecting chemicals, genes, and diseases

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1 Chemicals, Genes, & Diseases



Most chronic diseases involve interactions between environmental factors and genes that modulate physiological processes.

Understanding chemical-gene interactions will help resolve:

- disease predisposition
- therapeutic drug interactions
- health risks
- differential susceptibility to chemical exposures

2 The CTD Bioinformatics Approach

Navigation tabs help optimize the display of information

See all interacting genes (ranked)

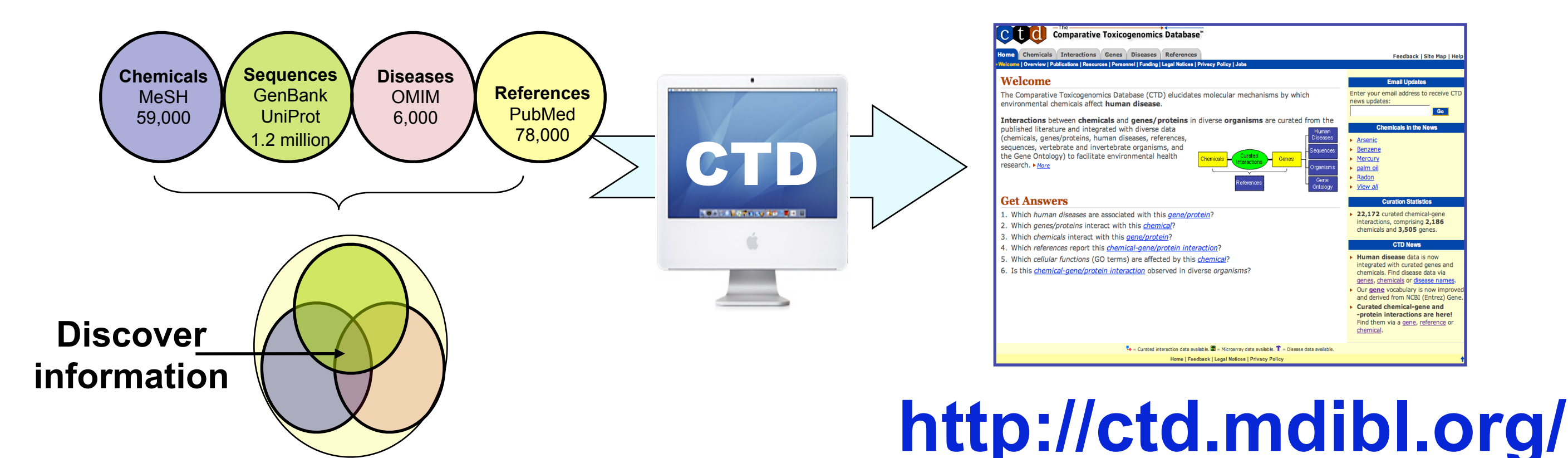
See top 10 gene interactions

See all interacting chemicals (ranked)

See top 10 chemical interactions

Click to OMM for disease description

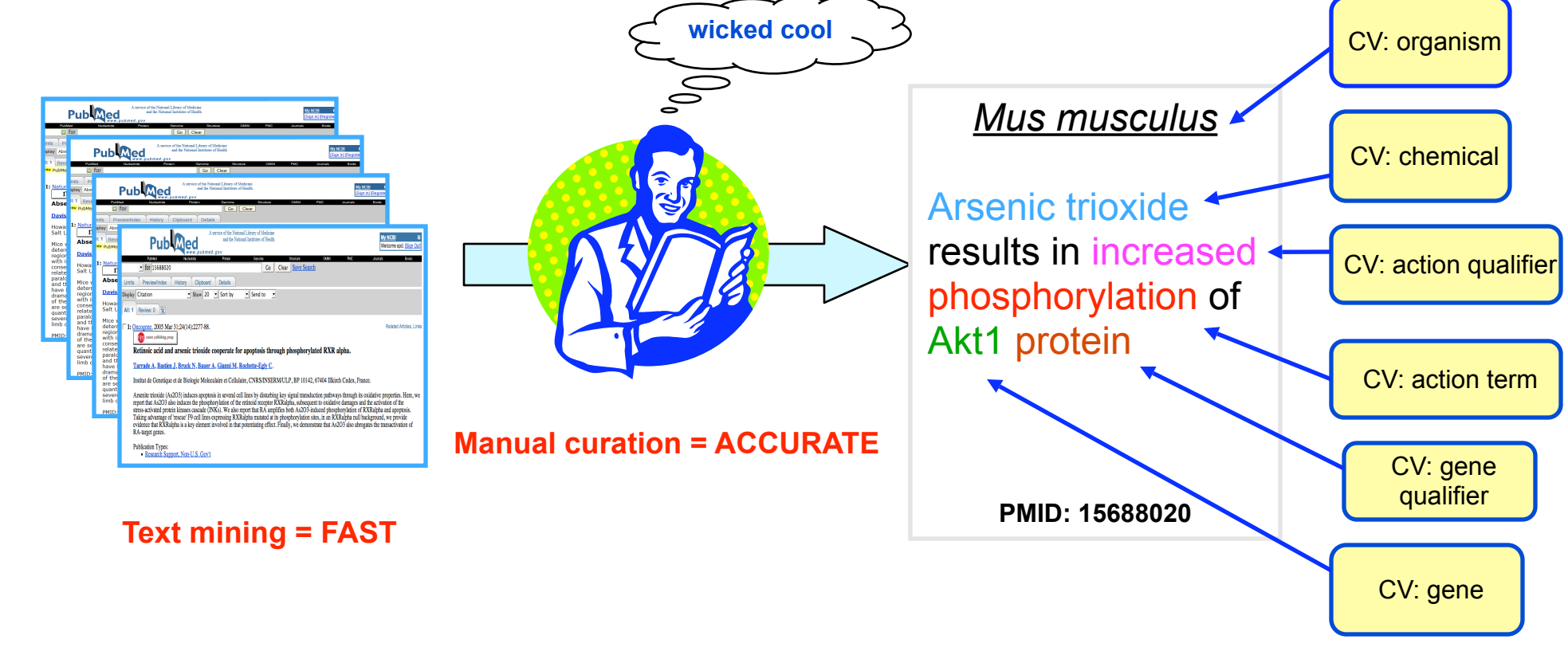
3 CTD uses both Text Mining + Manual Curation



We have taken a bioinformatics approach and are developing the Comparative Toxicogenomics Database (CTD) as a way to explore chemical-gene interactions in different organisms.

Dispersed data is integrated and curated to produce a unique database for the cross-species analysis of chemical, gene/protein, and disease relationships.

4 User-Friendly Query Pages



Manual curation of text-mined literature captures details for every chemical-gene interaction via controlled vocabularies.

CURRENT STATISTICS

29,911 interactions
 2,599 chemicals
 4,683 genes

5 Leveraging Curated Interactions in CTD: exploring integrated data from the perspective of a Gene, Chemical, or Disease

Q: arsenicals affect expression of which DNA-binding genes?

Q: what interactions describe chemical effects on genes involved in skeletal development?

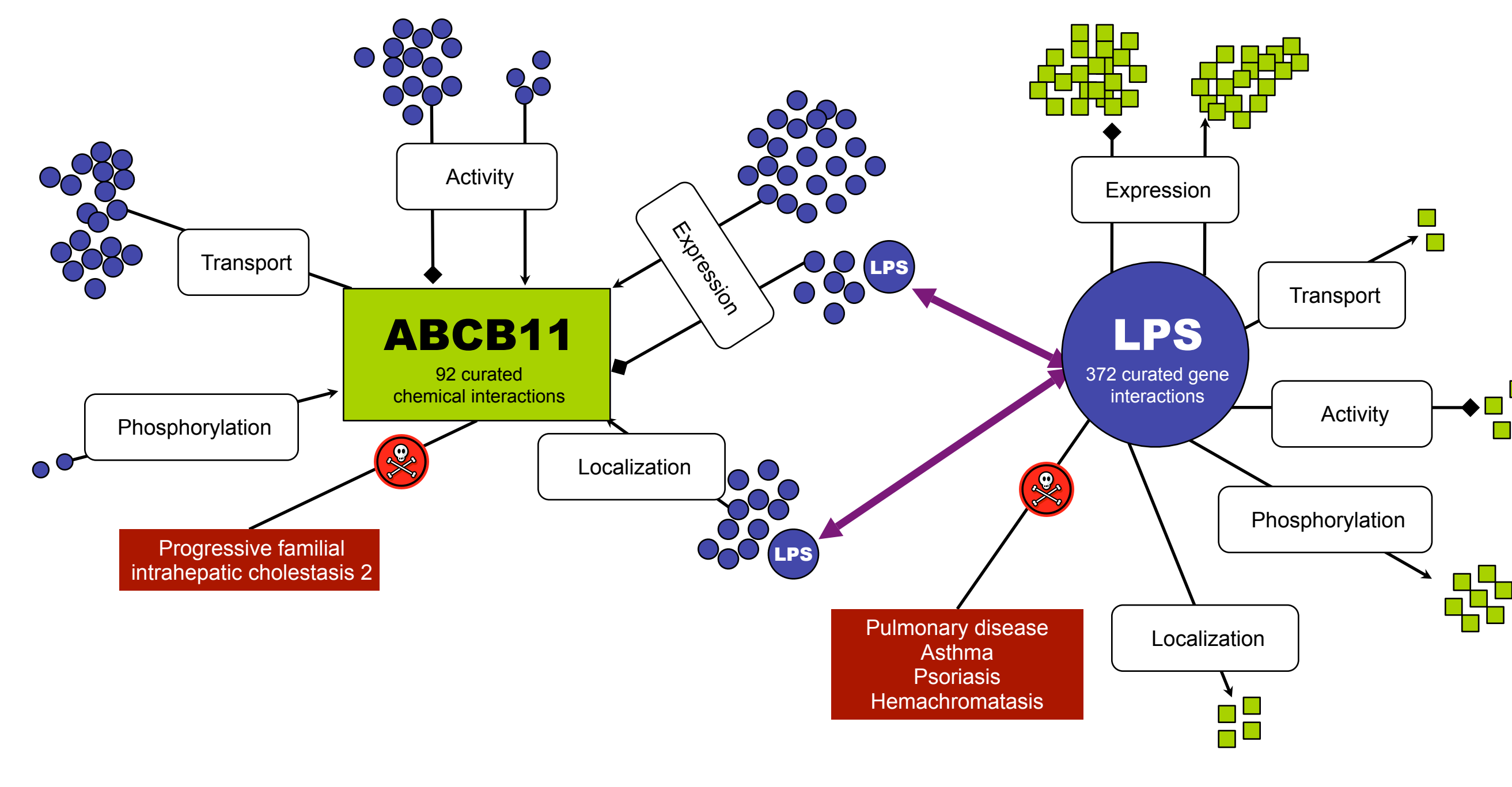
6 Using CTD to develop hypotheses

122 chemicals affect the activity or expression of CYP3A4

CYP3A4 affects the metabolism of at least 5 chemicals which also happen to affect the expression or activity of ABCB11.

Testable Hypothesis: 122 potentially novel chemical connections to ABCB11 (and it's associated disease)

7 Using CTD to build Chemical-Gene-Disease networks



Integration of additional data with chemicals and genes in CTD will enable users to evaluate these interactions and form hypotheses about their roles in disease (e.g., can interactions with genes help explain the correlation between LPS and the onset or severity of asthma?).

Begin building putative "chemical-gene-disease" networks

Sort data by clicking on any column header

Interaction tab shows details of the chemical-gene interaction.

Click to PubMed article

Export data to desktop

Find GO attributes for genes associated with the same disease or find other diseases caused by the gene.

Find multiple genes associated with the same disease and chemical.