



14

# BRICS USER GUIDE

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## UMLS Tool



## CHAPTER 14 – UMLS Tool

### 14.1 UMLS Objective

The BRICS data dictionary incorporates a mapping tool that links Unified Medical Language System (UMLS) concepts to BRICS CDEs. This integration allows users to leverage UMLS's vast repository of medical terminologies and concepts, ensuring alignment between clinical research data and standardized medical terminologies, further enhancing data interoperability and accuracy.

For more information regarding UMLS, refer to the following resources:

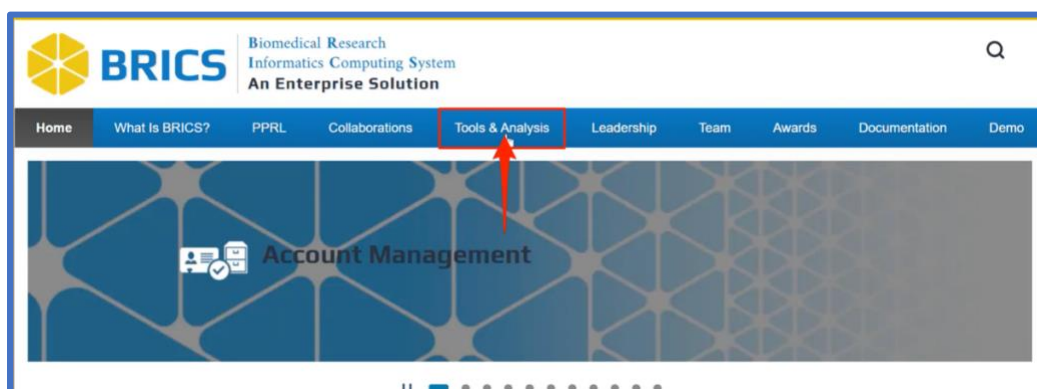
[Unified Medical Language System \(UMLS\)](#)

[Metathesaurus](#)

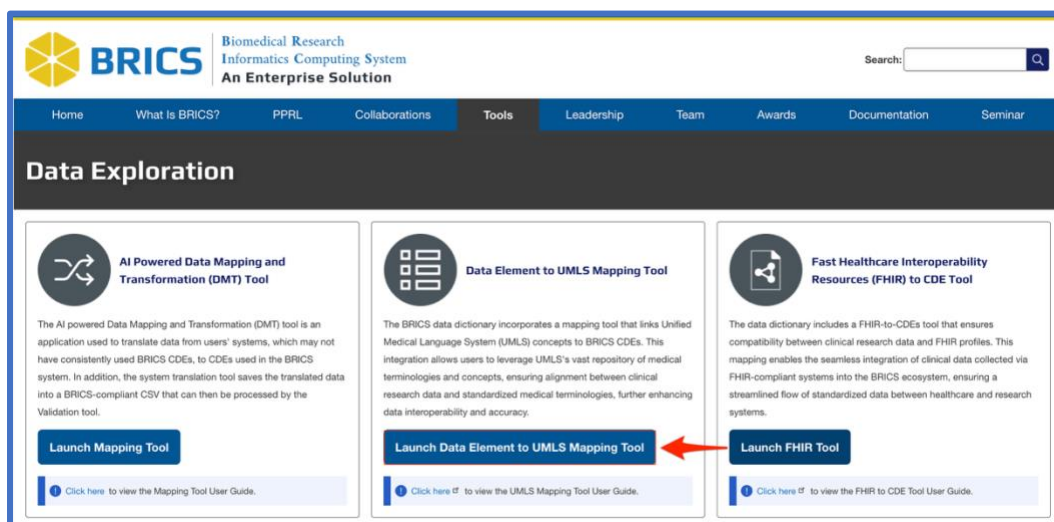
[Semantic Network](#)

### 14.2 Navigation to UMLS Tool

1. Navigate to the BRICS webpage
2. Select the Tools page at the top of the page



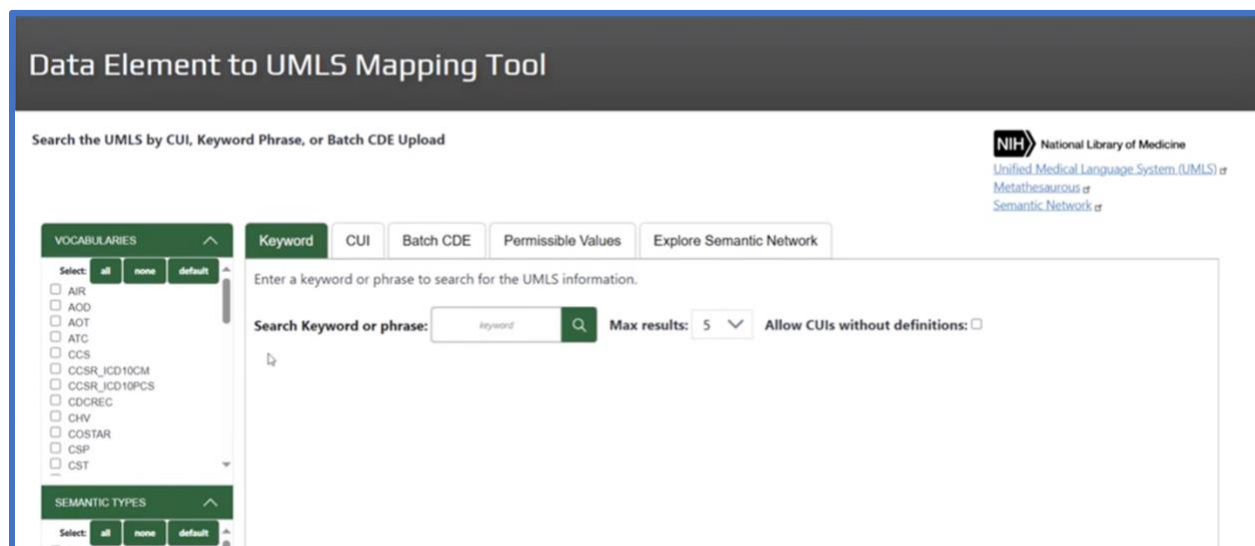
3. Select the **Launch Data Elements to UMLS Mapping Tool** button to open the page



## 14.3 Using the UMLS Tool

The UMLS Tool provides several tabs for viewing data. Users may

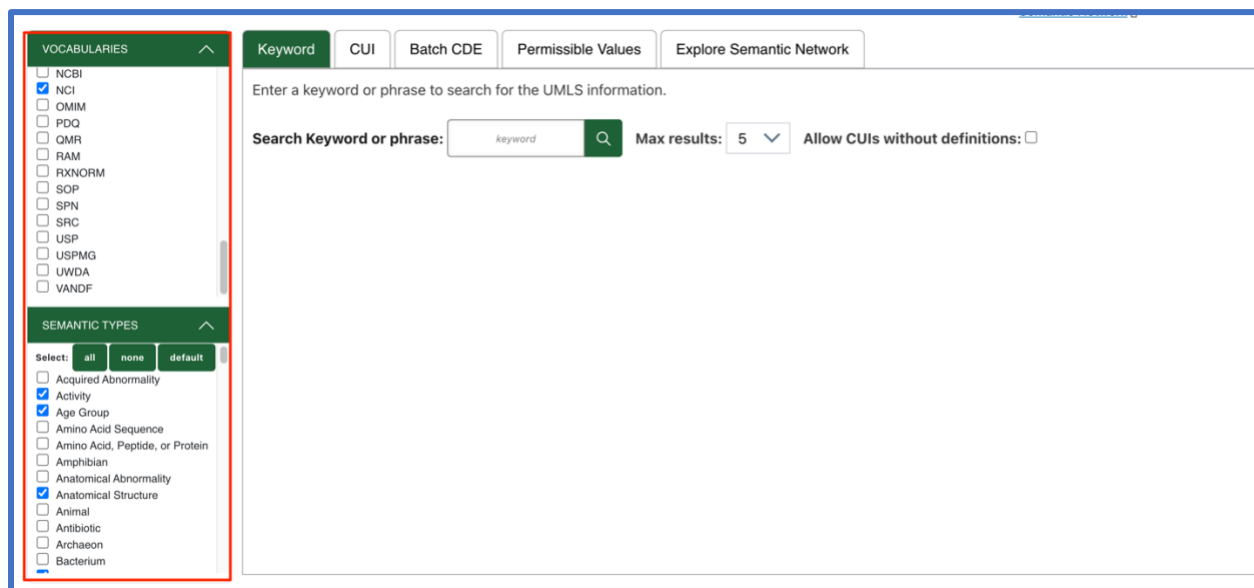
1. Search by keyword
2. Use Concept Unique Identifiers (CUI) to search
3. Upload multiple CDEs for mapping
4. Map permissible values
5. Explore the UMLS Semantic Network.



### 14.3.1 Filters

There are 2 sets of filters on the left of the page which are prefiltered to fit the most common use cases.

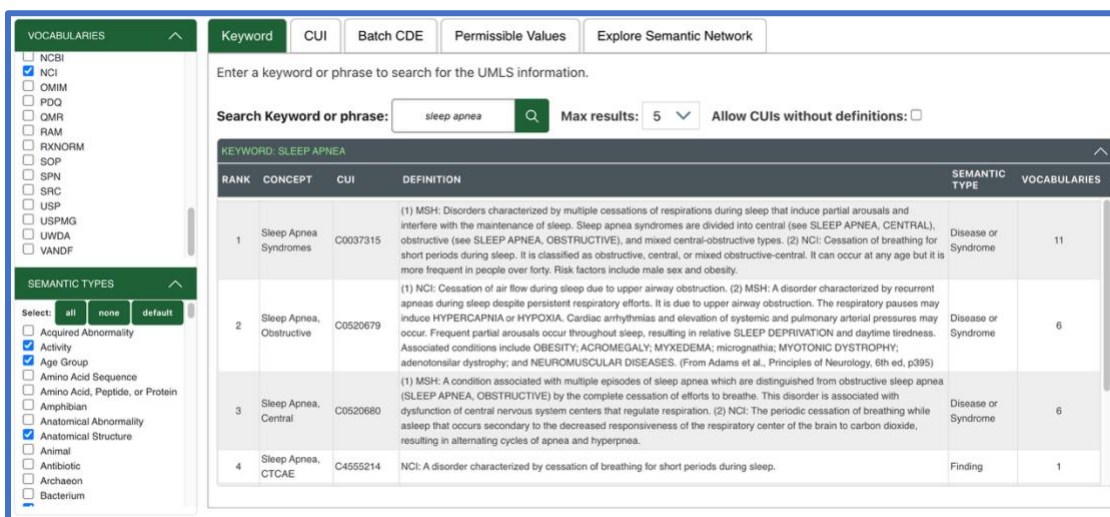
1. **Vocabularies** which contain different vocabularies of terms. Hovering over the term will show more information about that term.  
**NOTE: Some vocabularies are restricted and are prefiltered out. Only unrestricted vocabularies will be available in the list.**
2. **Semantic Types** which contain a list of different semantic types that UMLS CUI's are sorted into. Hovering over the semantic type will give more details about what it is.



The screenshot displays the BRICS application interface. On the left, there are two filter panels. The top panel, titled 'VOCABULARIES', contains a list of checkboxes for various vocabularies: NCBI, NCI (checked), OMIM, PDQ, QMR, RAM, RXNORM, SOP, SPN, SRC, USP, USPMG, UWDA, and VANDF. The bottom panel, titled 'SEMANTIC TYPES', has a 'Select:' dropdown with options 'all', 'none', and 'default'. Below this is a list of checkboxes for semantic types: Acquired Abnormality, Activity (checked), Age Group (checked), Amino Acid Sequence, Amino Acid, Peptide, or Protein, Amphibian, Anatomical Abnormality, Anatomical Structure (checked), Animal, Antibiotic, Archaeon, and Bacterium. The main area on the right features a search bar with the placeholder text 'Enter a keyword or phrase to search for the UMLS information.' Below the search bar is a 'Search Keyword or phrase:' label, a text input field containing 'keyword', a green search button with a magnifying glass icon, a 'Max results:' dropdown set to '5', and a checkbox for 'Allow CUIs without definitions:'. At the top of the main area, there are tabs for 'Keyword' (selected), 'CUI', 'Batch CDE', 'Permissible Values', and 'Explore Semantic Network'.

## 14.3.2 Keyword search

- To do a keyword search simply type in the Keyword or phrase you wish to search, and press enter. Users can also adjust the max results and the ability to include CUIs without definitions.



RANK	CONCEPT	CUI	DEFINITION	SEMANTIC TYPE	VOCABULARIES
1	Sleep Apnea Syndromes	C0037315	(1) MSH: Disorders characterized by multiple cessations of respirations during sleep that induce partial arousals and interfere with the maintenance of sleep. Sleep apnea syndromes are divided into central (see SLEEP APNEA, CENTRAL), obstructive (see SLEEP APNEA, OBSTRUCTIVE), and mixed central-obstructive types. (2) NCI: Cessation of breathing for short periods during sleep. It is classified as obstructive, central, or mixed obstructive-central. It can occur at any age but it is more frequent in people over forty. Risk factors include male sex and obesity.	Disease or Syndrome	11
2	Sleep Apnea, Obstructive	C0520679	(1) NCI: Cessation of air flow during sleep due to upper airway obstruction. (2) MSH: A disorder characterized by recurrent apneas during sleep despite persistent respiratory efforts. It is due to upper airway obstruction. The respiratory pauses may induce HYPERCAPNIA or HYPOXIA. Cardiac arrhythmias and elevation of systemic and pulmonary arterial pressures may occur. Frequent partial arousals occur throughout sleep, resulting in relative SLEEP DEPRIVATION and daytime tiredness. Associated conditions include OBESITY; ACROMEGALY; MYXEDEMA; micrognathia; MYOTONIC DYSTROPHY; adenotonsillar dysplasia; and NEUROMUSCULAR DISEASES. (From Adams et al., Principles of Neurology, 6th ed, p395)	Disease or Syndrome	6
3	Sleep Apnea, Central	C0520680	(1) MSH: A condition associated with multiple episodes of sleep apnea which are distinguished from obstructive sleep apnea (SLEEP APNEA, OBSTRUCTIVE) by the complete cessation of efforts to breathe. This disorder is associated with dysfunction of central nervous system centers that regulate respiration. (2) NCI: The periodic cessation of breathing while asleep that occurs secondary to the decreased responsiveness of the respiratory center of the brain to carbon dioxide, resulting in alternating cycles of apnea and hyperpnea.	Disease or Syndrome	6
4	Sleep Apnea, CTCAE	C4555214	NCI: A disorder characterized by cessation of breathing for short periods during sleep.	Finding	1

The data in the table is described as:

**RANK** – The resulting data is sorted by rank which is the most relevant concept given your search.

**CONCEPT** – The name of the concept

**CUI** – The Concept unique identifier

**Definition** – The definition column shows the definition of the concept. If multiple Vocabularies have definitions for the same concept, then you will see them shown in the definition like so:

**(1) VOCAB1: ... (2) VOCAB2: ...**

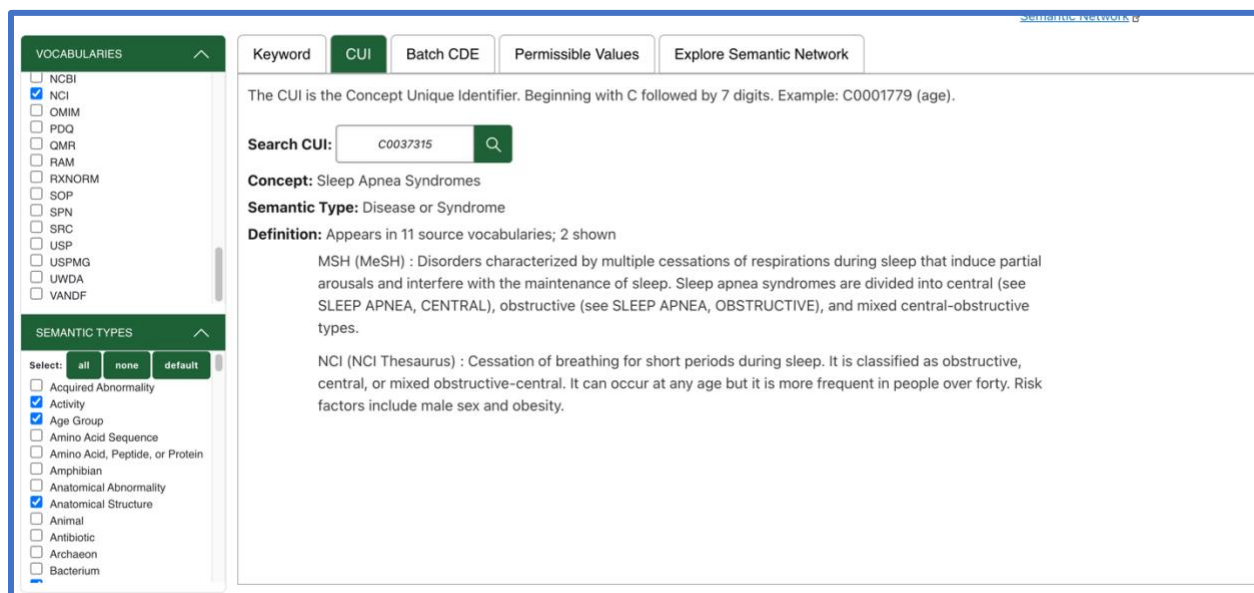
**Semantic Type** – Shows the semantic type of this concept.

**Vocabularies** – Shows the total number of vocabularies that this concept is associated with.

### 14.3.3 CUI search

The **CUI (Concept Unique Identifier)** tab allows searching by the CUI.

1. Enter the **Concept Unique Identifier** to see the information for the **CUI**.  
The Concept, Semantic Type(s), and Definition(s) for the selected vocabularies will be displayed.



The screenshot shows the BRICS CUI search interface. On the left, there are two panels: 'VOCABULARIES' and 'SEMANTIC TYPES'. The 'VOCABULARIES' panel lists various vocabularies with checkboxes, including NCI, OMIM, PDQ, QMR, RAM, RXNORM, SOP, SPN, SRC, USP, USPMG, UWDA, and VANDF. The 'SEMANTIC TYPES' panel has a 'Select:' dropdown with options 'all', 'none', and 'default', and a list of semantic types with checkboxes, including Acquired Abnormality, Activity, Age Group, Amino Acid Sequence, Amino Acid, Peptide, or Protein, Amphibian, Anatomical Abnormality, Anatomical Structure, Animal, Antibiotic, Archaeon, and Bacterium. The main panel has tabs for 'Keyword', 'CUI', 'Batch CDE', 'Permissible Values', and 'Explore Semantic Network'. The 'CUI' tab is selected. Below the tabs, there is a text box for 'Search CUI:' with the value 'C0037315' and a search button. The results section shows the following information:

The CUI is the Concept Unique Identifier. Beginning with C followed by 7 digits. Example: C0001779 (age).

**Search CUI:** C0037315

**Concept:** Sleep Apnea Syndromes

**Semantic Type:** Disease or Syndrome

**Definition:** Appears in 11 source vocabularies; 2 shown

MSH (MeSH) : Disorders characterized by multiple cessations of respirations during sleep that induce partial arousals and interfere with the maintenance of sleep. Sleep apnea syndromes are divided into central (see SLEEP APNEA, CENTRAL), obstructive (see SLEEP APNEA, OBSTRUCTIVE), and mixed central-obstructive types.

NCI (NCI Thesaurus) : Cessation of breathing for short periods during sleep. It is classified as obstructive, central, or mixed obstructive-central. It can occur at any age but it is more frequent in people over forty. Risk factors include male sex and obesity.

### 14.3.4 Batch CDE (Common Data Elements)

This tab allows **uploading a csv of data elements** to view the **UMLS data for each data element** in the csv.

**A common use case for the Batch CDE page is:**

Find data elements that do not have CUIs assigned to them in Data Dictionary.

Export those data elements from Data Dictionary.

Upload that file here to search for the CUIs and select them.

Export the selected CUIs for the Data Element(s) using the Export BRICS CSV button.

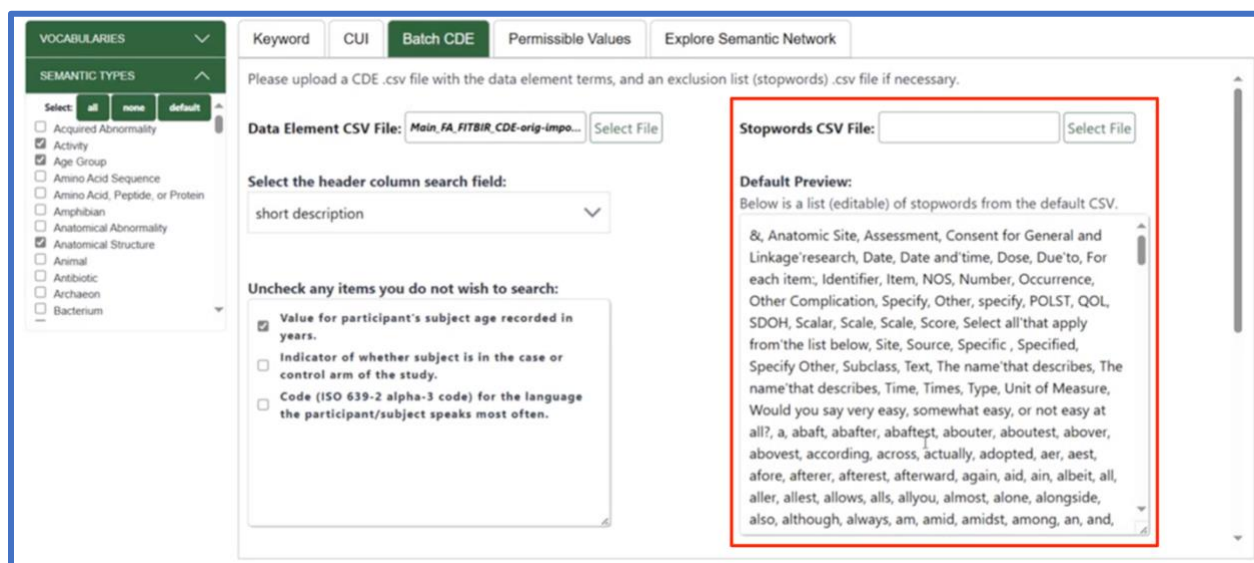
Reupload the Data Elements to BRICS which will now contain the CUIs selected.

First let's go over the **Stopwords** section that you see on the right side of the page.

**Stopwords** are words that we do not wish to be part of our CUI search because they are unhelpful or commonly misspelled words/phrases.

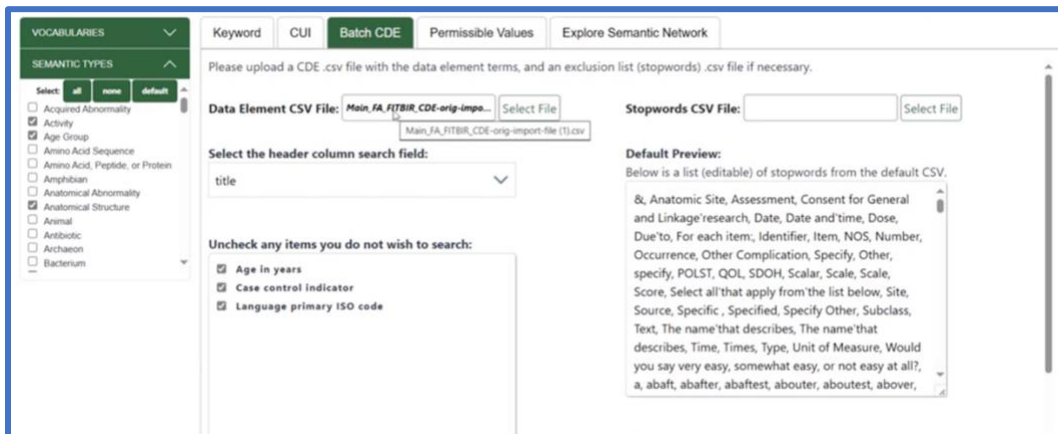
We are able to **upload a csv file** for our stopwords or manually edit them in the text box.

**NOTE A default list of stop words/phrases is provided.**



Now let's upload a file and find the CUI's for the data elements in that file.

1. Click **Select File** and upload a **Data Elements CSV**.



VOCABULARIES

SEMANTIC TYPES

Select: all none default

- ☐ Acquired Abnormality
- ☒ Activity
- ☒ Age Group
- ☐ Amino Acid Sequence
- ☐ Amino Acid, Peptide, or Protein
- ☐ Amphibian
- ☐ Anatomical Abnormality
- ☒ Anatomical Structure
- ☐ Animal
- ☐ Antibiotic
- ☐ Archaeon
- ☐ Bacterium

Keyword CUI **Batch CDE** Permissible Values Explore Semantic Network

Please upload a CDE .csv file with the data element terms, and an exclusion list (stopwords) .csv file if necessary.

Data Element CSV File:

Stopwords CSV File:

Select the header column search field:

title

Uncheck any items you do not wish to search:

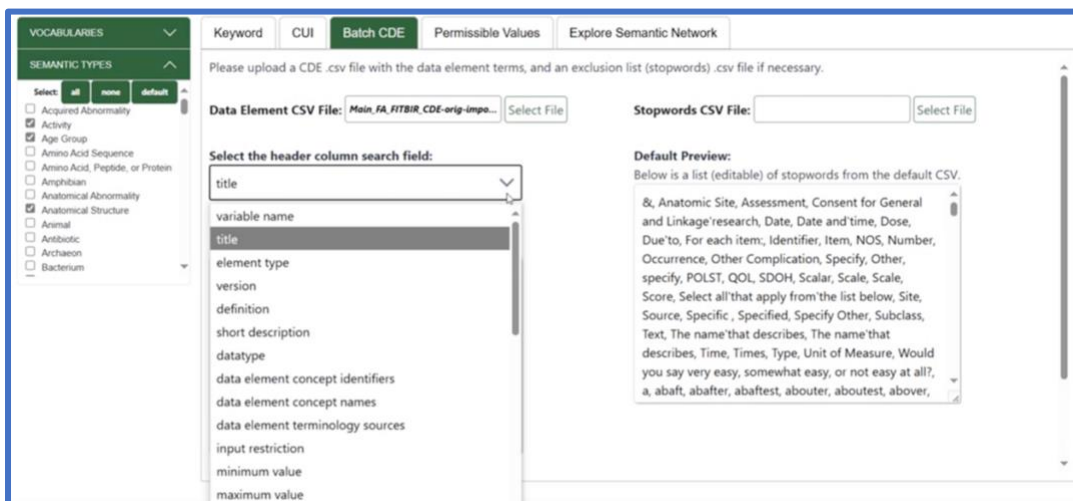
- ☒ Age in years
- ☒ Case control indicator
- ☒ Language primary ISO code

Default Preview:

Below is a list (editable) of stopwords from the default CSV.

&, Anatomic Site, Assessment, Consent for General and Linkage research, Date, Date and time, Dose, Due to, For each item, Identifier, Item, NOS, Number, Occurrence, Other Complication, Specify, Other, specify, POLST, QOL, SDOH, Scalar, Scale, Scale, Score, Select all that apply from the list below, Site, Source, Specific, Specified, Specify Other, Subclass, Text, The name that describes, The name that describes, Time, Times, Type, Unit of Measure, Would you say very easy, somewhat easy, or not easy at all?, a, abaft, abaft, abafest, abouter, aboutest, abover,

2. Change the header column to view that column for the data elements shown.



VOCABULARIES

SEMANTIC TYPES

Select: all none default

- ☐ Acquired Abnormality
- ☒ Activity
- ☒ Age Group
- ☐ Amino Acid Sequence
- ☐ Amino Acid, Peptide, or Protein
- ☐ Amphibian
- ☐ Anatomical Abnormality
- ☒ Anatomical Structure
- ☐ Animal
- ☐ Antibiotic
- ☐ Archaeon
- ☐ Bacterium

Keyword CUI **Batch CDE** Permissible Values Explore Semantic Network

Please upload a CDE .csv file with the data element terms, and an exclusion list (stopwords) .csv file if necessary.

Data Element CSV File:

Stopwords CSV File:

Select the header column search field:

variable name

title

element type

version

definition

short description

datatype

data element concept identifiers

data element concept names

data element terminology sources

input restriction

minimum value

maximum value

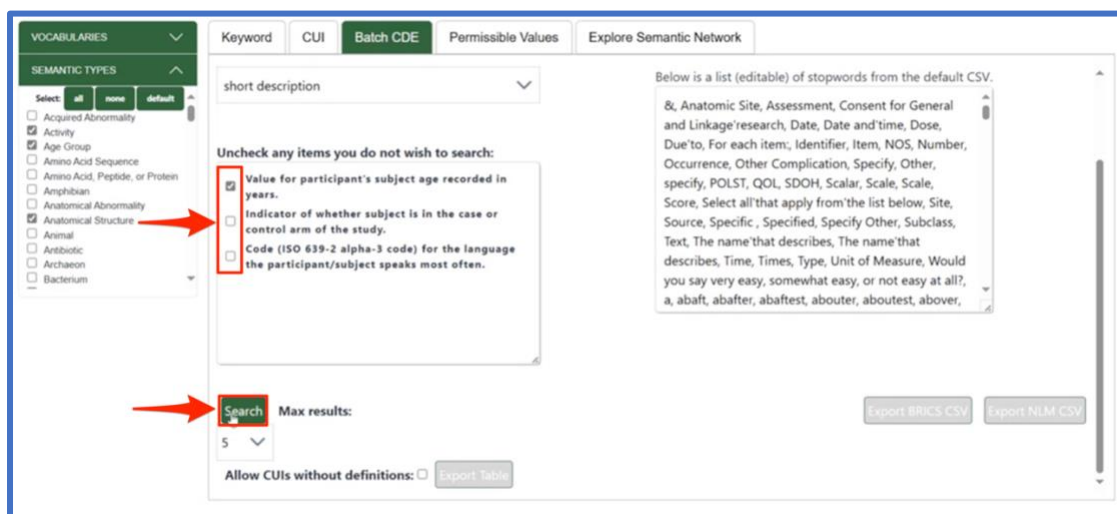
Default Preview:

Below is a list (editable) of stopwords from the default CSV.

&, Anatomic Site, Assessment, Consent for General and Linkage research, Date, Date and time, Dose, Due to, For each item, Identifier, Item, NOS, Number, Occurrence, Other Complication, Specify, Other, specify, POLST, QOL, SDOH, Scalar, Scale, Scale, Score, Select all that apply from the list below, Site, Source, Specific, Specified, Specify Other, Subclass, Text, The name that describes, The name that describes, Time, Times, Type, Unit of Measure, Would you say very easy, somewhat easy, or not easy at all?, a, abaft, abaft, abafest, abouter, aboutest, abover,



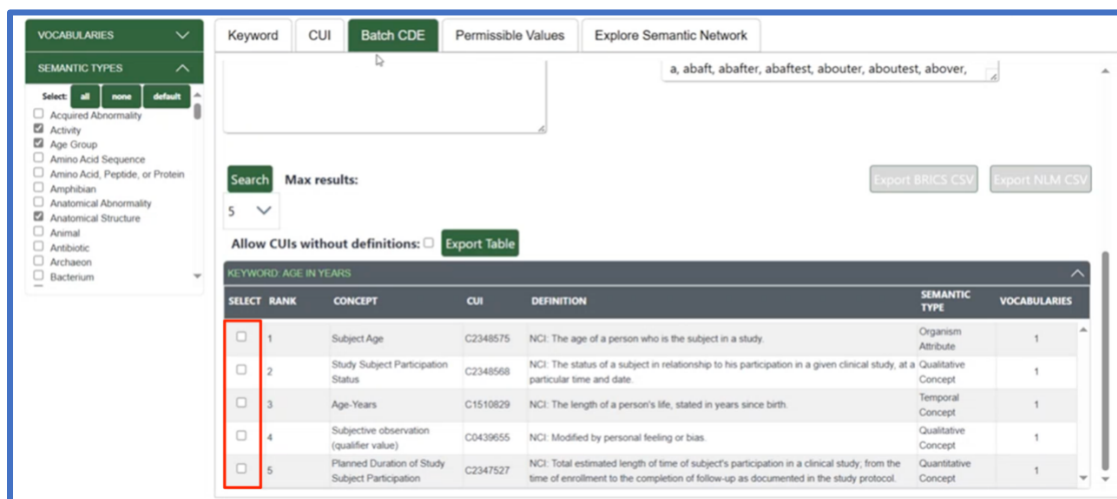
3. Deselect the element(s) that you do not wish to search for and then click the **Search** button.



Below is a list (editable) of stopwords from the default CSV.

&, Anatomic Site, Assessment, Consent for General and Linkage research, Date, Date and time, Dose, Due to, For each item, Identifier, Item, NOS, Number, Occurrence, Other Complication, Specify, Other, specify, POLST, QOL, SDOH, Scalar, Scale, Scale, Score, Select all that apply from the list below, Site, Source, Specific, Specified, Specify Other, Subclass, Text, The name that describes, The name that describes, Time, Times, Type, Unit of Measure, Would you say very easy, somewhat easy, or not easy at all?, a, abaft, abafter, abafest, abouter, aboutest, abover,

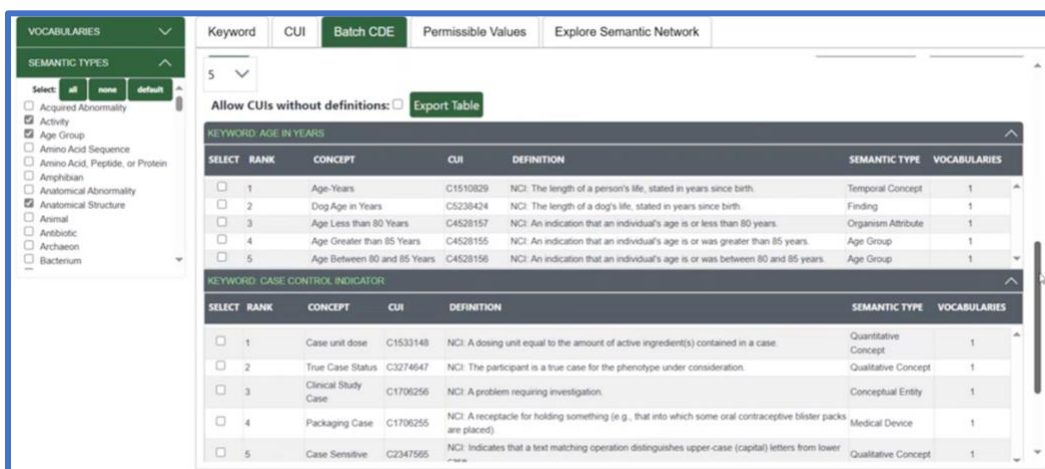
4. The table of CUIs will show. Use the select box to associate the CUIs with a data element.  
**NOTE: We can select up to 3 CUIs to be associated with each Data Element.**



KEYWORD: AGE IN YEARS

SELECT	RANK	CONCEPT	CUI	DEFINITION	SEMANTIC TYPE	VOCABULARIES
<input type="checkbox"/>	1	Subject Age	C2348575	NCI: The age of a person who is the subject in a study.	Organism Attribute	1
<input type="checkbox"/>	2	Study Subject Participation Status	C2348568	NCI: The status of a subject in relationship to his participation in a given clinical study, at a particular time and date.	Qualitative Concept	1
<input type="checkbox"/>	3	Age-Years	C1510629	NCI: The length of a person's life, stated in years since birth.	Temporal Concept	1
<input type="checkbox"/>	4	Subjective observation (qualifier value)	C0439655	NCI: Modified by personal feeling or bias.	Qualitative Concept	1
<input type="checkbox"/>	5	Planned Duration of Study Subject Participation	C2347527	NCI: Total estimated length of time of subject's participation in a clinical study, from the time of enrollment to the completion of follow-up as documented in the study protocol.	Quantitative Concept	1

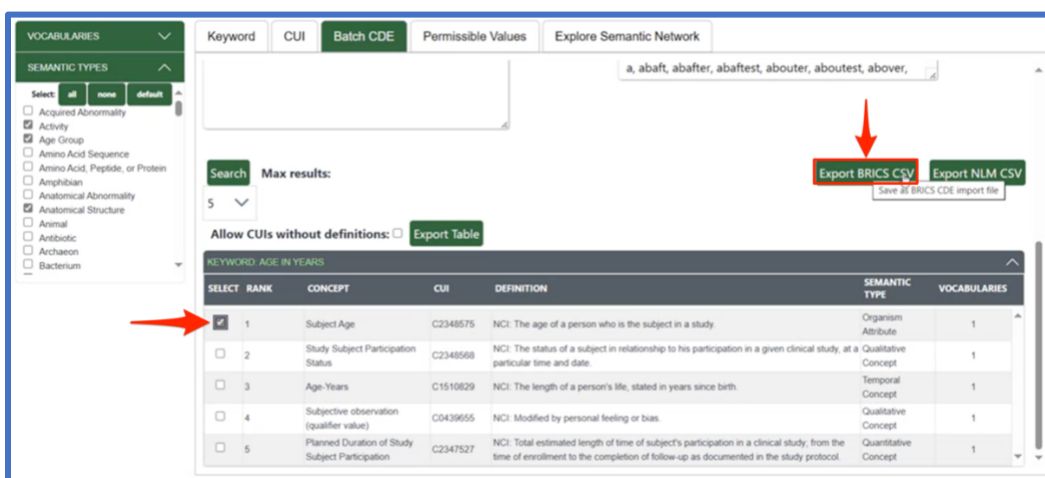
**NOTE:** If there are multiple Data Elements selected, then a table for each data element will show, allowing users to select the CUIs for the different data elements:



The screenshot shows the BRICS interface with the 'Batch CDE' tab selected. The left sidebar shows 'SEMANTIC TYPES' with 'Age Group' selected. The main area displays a table for the keyword 'AGE IN YEARS'.

SELECT	RANK	CONCEPT	CUI	DEFINITION	SEMANTIC TYPE	VOCABULARIES
<input type="checkbox"/>	1	Age-Years	C1510829	NCI: The length of a person's life, stated in years since birth.	Temporal Concept	1
<input type="checkbox"/>	2	Dog Age in Years	C5238424	NCI: The length of a dog's life, stated in years since birth.	Finding	1
<input type="checkbox"/>	3	Age Less than 90 Years	C4528157	NCI: An indication that an individual's age is or less than 90 years.	Organism Attribute	1
<input type="checkbox"/>	4	Age Greater than 85 Years	C4528155	NCI: An indication that an individual's age is or was greater than 85 years.	Age Group	1
<input type="checkbox"/>	5	Age Between 90 and 85 Years	C4528156	NCI: An indication that an individual's age is or was between 80 and 85 years.	Age Group	1

- To create a BRICS CSV for uploading the Data Elements with the selected CUIs back in then select the **Export BRICS CSV** button.



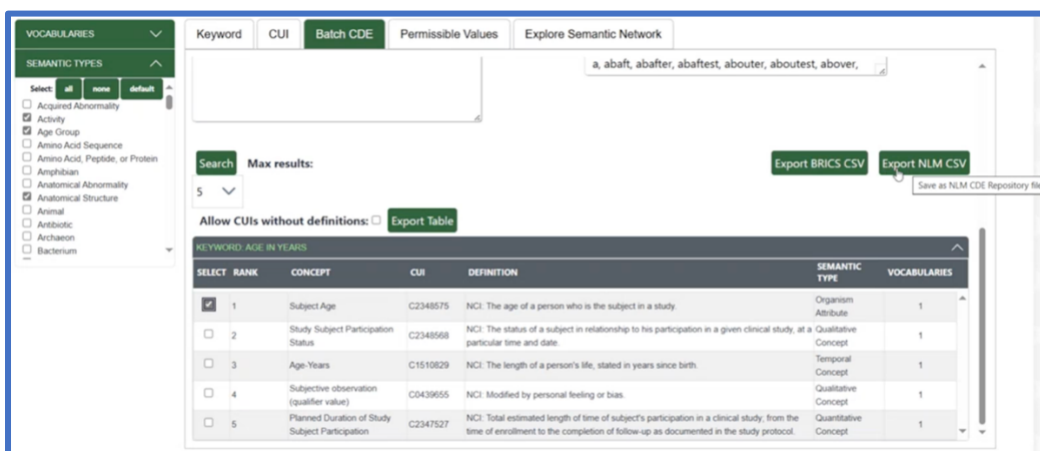
The screenshot shows the BRICS interface with the 'Batch CDE' tab selected. The left sidebar shows 'SEMANTIC TYPES' with 'Age Group' selected. The main area displays a table for the keyword 'AGE IN YEARS'.

At the top right, there is a search bar with the text 'a, abaft, abafter, abafest, abouter, aboutest, abover,'. Below the search bar, there are two buttons: 'Export BRICS CSV' and 'Export NLM CSV'. A red arrow points to the 'Export BRICS CSV' button.

Below the buttons, there is a table for the keyword 'AGE IN YEARS'.

SELECT	RANK	CONCEPT	CUI	DEFINITION	SEMANTIC TYPE	VOCABULARIES
<input checked="" type="checkbox"/>	1	Subject Age	C2348575	NCI: The age of a person who is the subject in a study.	Organism Attribute	1
<input type="checkbox"/>	2	Study Subject Participation Status	C2348568	NCI: The status of a subject in relationship to his participation in a given clinical study, at a particular time and date.	Qualitative Concept	1
<input type="checkbox"/>	3	Age-Years	C1510829	NCI: The length of a person's life, stated in years since birth.	Temporal Concept	1
<input type="checkbox"/>	4	Subjective observation (qualifier value)	C0439655	NCI: Modified by personal feeling or bias.	Qualitative Concept	1
<input type="checkbox"/>	5	Planned Duration of Study Subject Participation	C2347527	NCI: Total estimated length of time of subject's participation in a clinical study, from the time of enrollment to the completion of follow-up as documented in the study protocol.	Quantitative Concept	1

6. To create a NLM (National Library of Medicine) CSV then click **Export NLM CSV**.

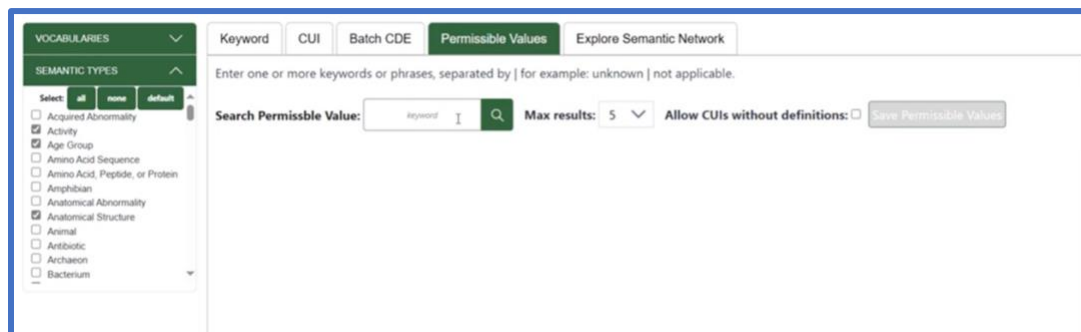


KEYWORD: AGE IN YEARS

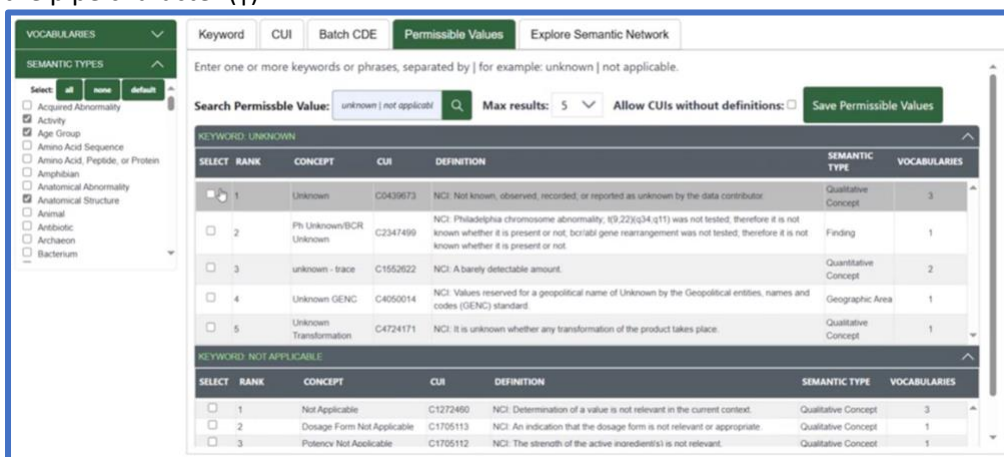
SELECT	RANK	CONCEPT	CUI	DEFINITION	SEMANTIC TYPE	VOCABULARIES
<input checked="" type="checkbox"/>	1	Subject Age	C2348575	NCI: The age of a person who is the subject in a study.	Organism Attribute	1
<input type="checkbox"/>	2	Study Subject Participation Status	C2348568	NCI: The status of a subject in relationship to his participation in a given clinical study, at a Qualitative particular time and date.	Concept	1
<input type="checkbox"/>	3	Age-Years	C1510829	NCI: The length of a person's life, stated in years since birth.	Temporal Concept	1
<input type="checkbox"/>	4	Subjective observation (qualifier value)	C0439655	NCI: Modified by personal feeling or bias.	Qualitative Concept	1
<input type="checkbox"/>	5	Planned Duration of Study Subject Participation	C2347527	NCI: Total estimated length of time of subject's participation in a clinical study, from the time of enrollment to the completion of follow-up as documented in the study protocol.	Quantitative Concept	1

## 14.3.5 Permissible Values

This page allows us to find CUI(s) by searching for a **Permissible Values**, selecting CUIs for that Permissible Value and saving a file to upload to BRICS to update the permissible value to have the selected CUI(s).

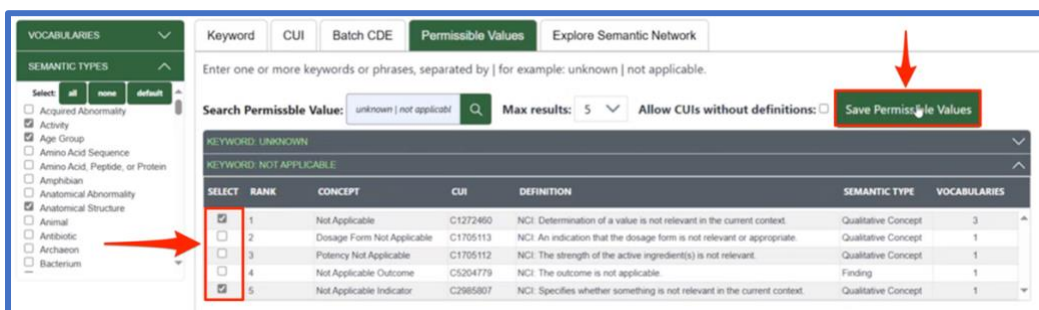


1. We can search for a Permissible Value or multiple Permissible Values by separating them with the pipe character (|).



SELECT	RANK	CONCEPT	CUI	DEFINITION	SEMANTIC TYPE	VOCABULARIES
<b>KEYWORD: UNKNOWN</b>						
<input type="checkbox"/>	1	Unknown	C5439673	NCI: Not known, observed, recorded, or reported as unknown by the data contributor.	Qualitative Concept	3
<input type="checkbox"/>	2	Ph Unknown/BCR Unknown	C2347499	NCI: Philadelphia chromosome abnormality, t(9;22)(q34;q11) was not tested; therefore it is not known whether it is present or not; bcrabl gene rearrangement was not tested; therefore it is not known whether it is present or not.	Finding	1
<input type="checkbox"/>	3	unknown - trace	C1552622	NCI: A barely detectable amount.	Quantitative Concept	2
<input type="checkbox"/>	4	Unknown GENC	C4050014	NCI: Values reserved for a geopolitical name of Unknown by the Geopolitical entities, names and codes (GENC) standard.	Geographic Area	1
<input type="checkbox"/>	5	Unknown Transformation	C4724171	NCI: It is unknown whether any transformation of the product takes place.	Qualitative Concept	1
<b>KEYWORD: NOT APPLICABLE</b>						
<input type="checkbox"/>	1	Not Applicable	C1272460	NCI: Determination of a value is not relevant in the current context.	Qualitative Concept	3
<input type="checkbox"/>	2	Dosage Form Not Applicable	C1705113	NCI: An indication that the dosage form is not relevant or appropriate.	Qualitative Concept	1
<input type="checkbox"/>	3	Potency Not Applicable	C1705112	NCI: The strength of the active ingredient(s) is not relevant.	Qualitative Concept	1

2. We can **select up to 3 CUI(s) for each Permissible Value**. Then press Save Permissible Values to save a CSV file that can be uploaded to BRICS to update the Permissible Values with the selected CUI(s).



SELECT	RANK	CONCEPT	CUI	DEFINITION	SEMANTIC TYPE	VOCABULARIES
<b>KEYWORD: UNKNOWN</b>						
<b>KEYWORD: NOT APPLICABLE</b>						
<input checked="" type="checkbox"/>	1	Not Applicable	C1272460	NCI: Determination of a value is not relevant in the current context.	Qualitative Concept	3
<input checked="" type="checkbox"/>	2	Dosage Form Not Applicable	C1705113	NCI: An indication that the dosage form is not relevant or appropriate.	Qualitative Concept	1
<input type="checkbox"/>	3	Potency Not Applicable	C1705112	NCI: The strength of the active ingredient(s) is not relevant.	Qualitative Concept	1
<input type="checkbox"/>	4	Not Applicable Outcome	C5204779	NCI: The outcome is not applicable.	Finding	1
<input checked="" type="checkbox"/>	5	Not Applicable Indicator	C2985807	NCI: Specifies whether something is not relevant in the current context.	Qualitative Concept	1

### 14.3.6 Explore Semantic Network

This page visualizes the semantic types, allowing users to see the selected Semantic Types drawn out as a tree.

This can help disambiguate when there is confusion of what **CUI** to assign.

The graph is interactive allowing to expand/collapse nodes by clicking on them as well as viewing additional information when hovering over each node.

**NOTE: Leaf Nodes will be green while non leaf nodes will be blue.**

