Australian Government
Australian Digital Health Agency

Searching SNOMED CT-AU using the Shrimp browser

The Shrimp terminology browser

- The Shrimp browser is a free, web-based terminology browser that can be used to browse SNOMED CT-AU (including AMT) content.
  - Allows people to browse terminology without having to build their own database, or implement the terminology data.
  - Provides descriptions of a given concept.
  - Displays how the concepts are related to each other, and the modelling of each concept.

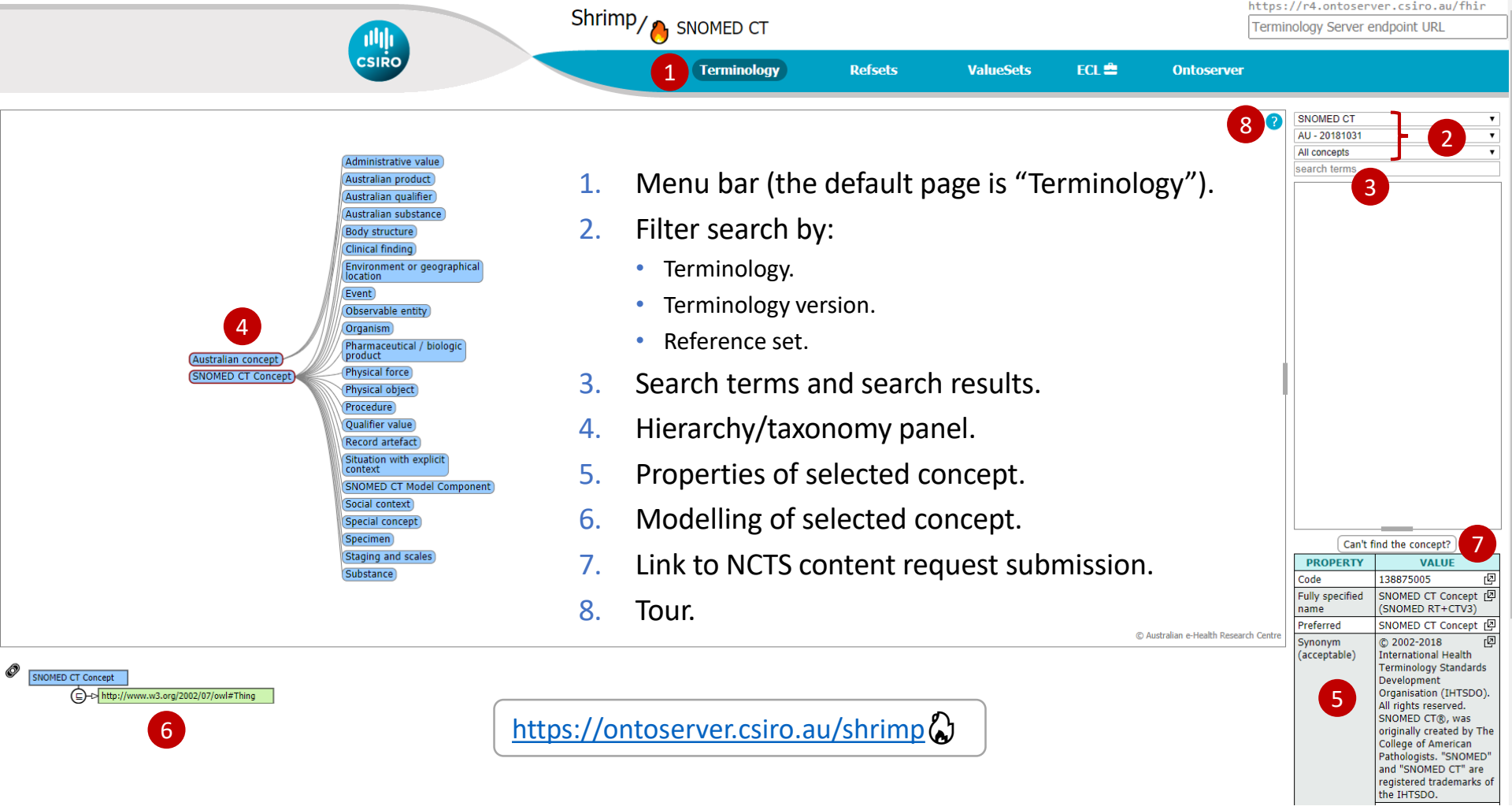
- It is useful to use this browser when…
  - You are learning about SNOMED CT-AU (or the AMT).
  - You are evaluating SNOMED CT-AU for its clinical content.
  - You have a SNOMED CT code or description and want to see what the concept is.
  - You would like to request addition of a concept in SNOMED CT-AU and want to see where it could be suitably located in the SNOMED CT hierarchies.
  - You are looking for suitable SNOMED CT-AU descriptions or concepts for mapping.
  - You are interested in the properties of a concept for data analytics.

The Shrimp terminology browser

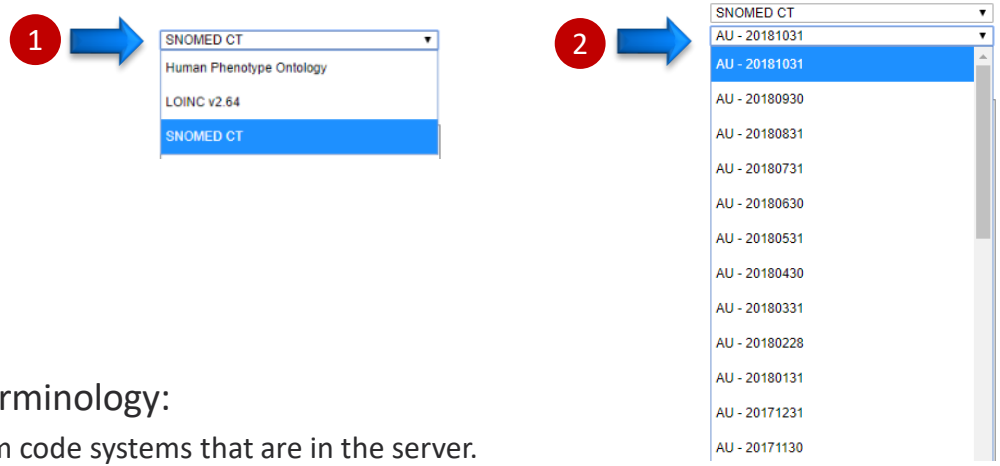
- It is owned and maintained by the Australian e-Health Research Centre of the CSIRO.
  - This is one example of a SNOMED CT-AU implementation.
  - How you search for content and what is displayed will be different to how you interact with SNOMED CT-AU implemented in your clinical information system.

- It can be accessed from either:
  - The NCTS website on https://www.healthterminologies.gov.au/tools; or
  - Directly from the link https://ontoserver.csiro.au/shrimp

Terminology browser

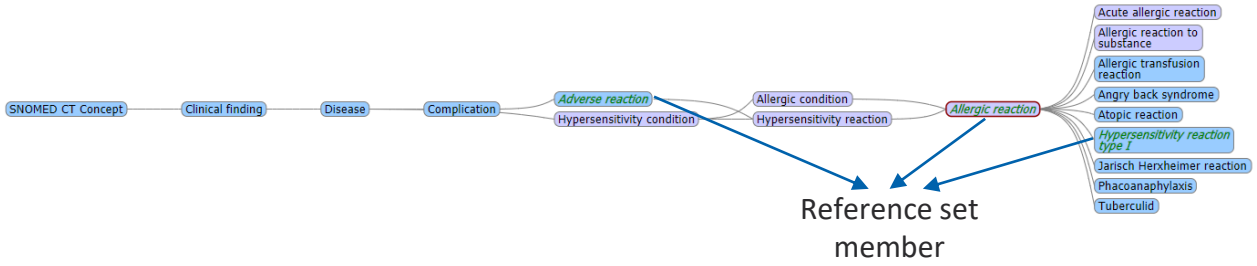

Shrimp / SNOMED CT
https://r4.ontoserver.csiro.au/fhir
Terminology Server endpoint URL
1
Terminology
Refsets
ValueSets
ECL
Ontoserver
8
SNOMED CT
AU - 20181031
All concepts
2
search terms
3
4
Australian concept
SNOMED CT Concept
Administrative value
Australian product
Australian qualifier
Australian substance
Body structure
Clinical finding
Environment or geographical location
Event
Observable entity
Organism
Pharmaceutical / biologic product
Physical force
Physical object
Procedure
Qualifier value
Record artefact
Situation with explicit context
SNOMED CT Model Component
Social context
Special concept
Specimen
Staging and scales
Substance
1. Menu bar (the default page is “Terminology”).
2. Filter search by:
• Terminology.
• Terminology version.
• Reference set.
3. Search terms and search results.
4. Hierarchy/taxonomy panel.
5. Properties of selected concept.
6. Modelling of selected concept.
7. Link to NCTS content request submission.
8. Tour.
Can't find the concept?
7
PROPERTY
VALUE
Code
138875005
Fully specified name
SNOMED CT Concept (SNOMED RT+CTV3)
Preferred
SNOMED CT Concept
Synonym (acceptable)
© 2002-2018 International Health Terminology Standards Development Organisation (IHTSDO). All rights reserved. SNOMED CT®, was originally created by The College of American Pathologists. "SNOMED" and "SNOMED CT" are registered trademarks of the IHTSDO.
5
© Australian e-Health Research Centre
SNOMED CT Concept
http://www.w3.org/2002/07/owl#Thing
6
https://ontoserver.csiro.au/shrimp

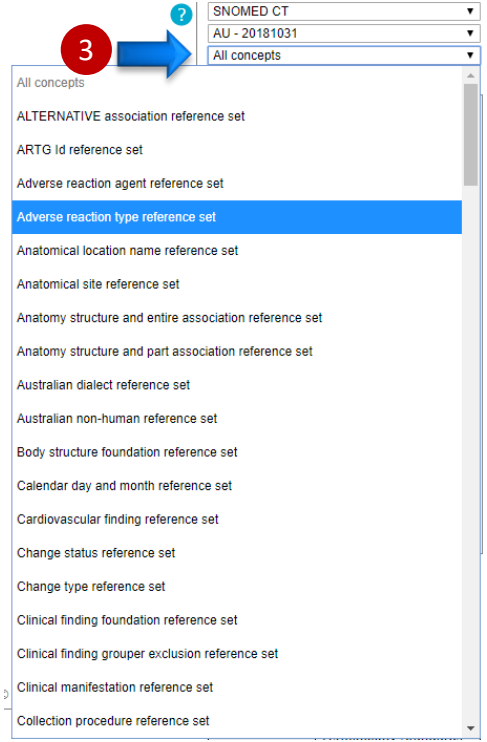
Filter by terminology and version



1. Filter by terminology:
   - Select from code systems that are in the server.
   - Default is SNOMED CT.
2. Filter by version:
   - Select from particular versions of the terminology.
   - Default is the current version of SNOMED CT-AU.

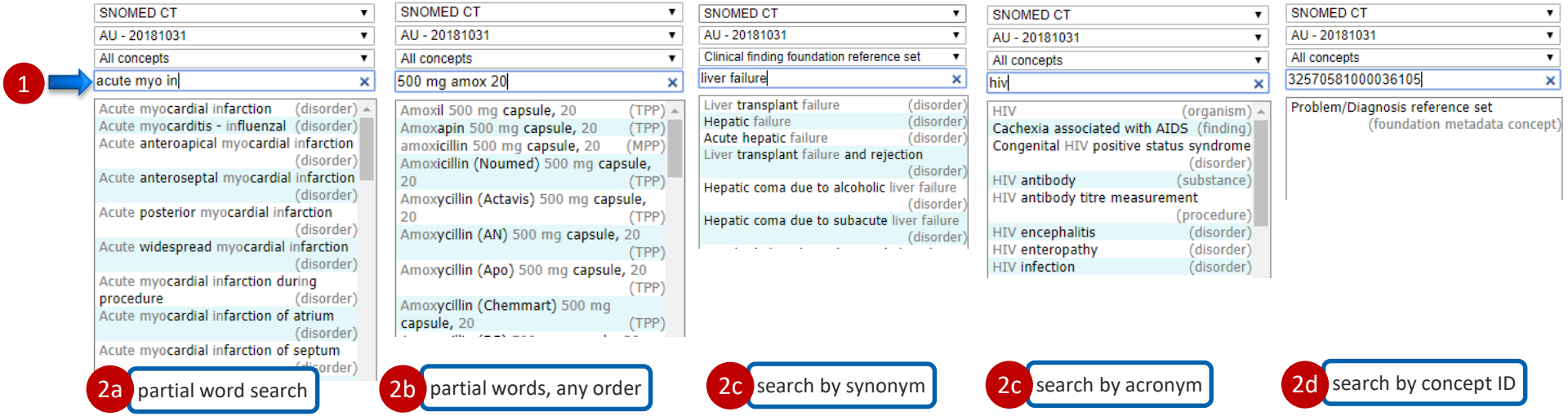
Filter by reference set





3. Filter by reference set:
   - Limit the search to members of a particular reference set.
   - Default is All concepts (everything included in SNOMED CT-AU).
   - When filtered, the Hierarchy panel will show some concepts with green text to indicate they are members of the selected reference set.
   - For more information, refer to the *SNOMED CT-AU Development Approach for Reference Sets* in the NCTS document library.
     - Provides a list of reference sets available from the NCTS.
     - Describes why and how the reference sets were developed, along with example content.

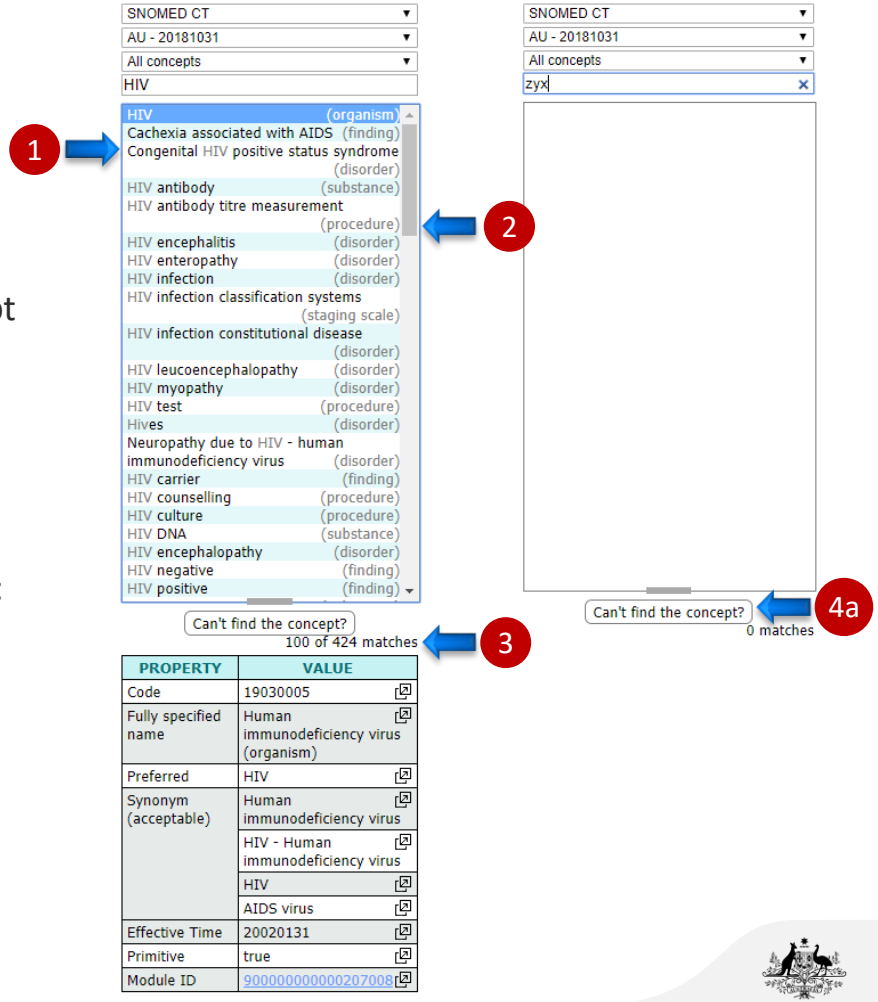
Search terms



1. Type in one or more terms in the Search bar.
   - Capitalisation is ignored, for example, “hiv” will return “HIV”, “HIV antibody”, etc.
2. Shrimp supports searching on:
   a. Partial words (at least two characters).
   b. Words in any order.
   c. Synonyms (including many acronyms).
   d. SNOMED CT concept IDs or codes.

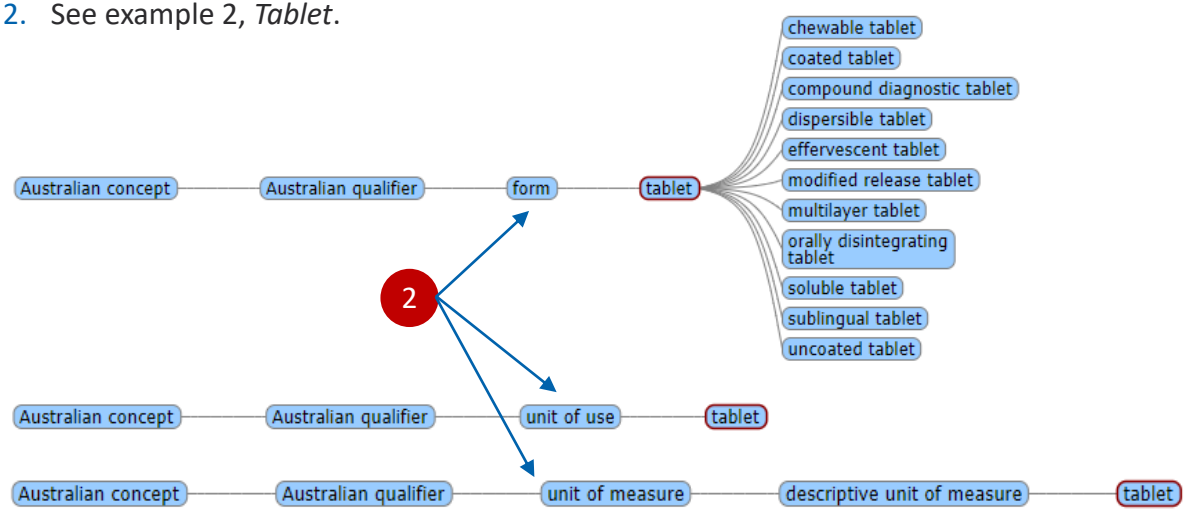
Search results

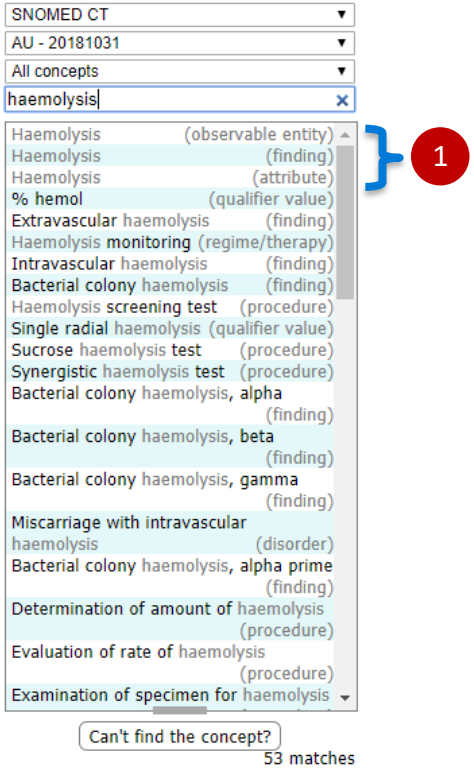
1. Preferred term of the concept is displayed.
2. Semantic tag (word in brackets) to the right of each term describes the sub-hierarchy in which the concept is located.
   - The Semantic tag is a part of the Fully specified name, however this tool displays it with the Preferred term to allow easier interpretation of the search result.
3. Searching returns the top 100 matches only.
   - Type in more search terms to narrow down the list.
4. If you cannot find a concept you're looking for, either:
   a. Click on the "Can't find the concept?" button.
      » This links to the content request submission page on the NCTS website.
      » Fill in details of any missing content you'd like added to SNOMED CT-AU or AMT.
   b. Email help@digitalhealth.gov.au (not shown in this diagram).



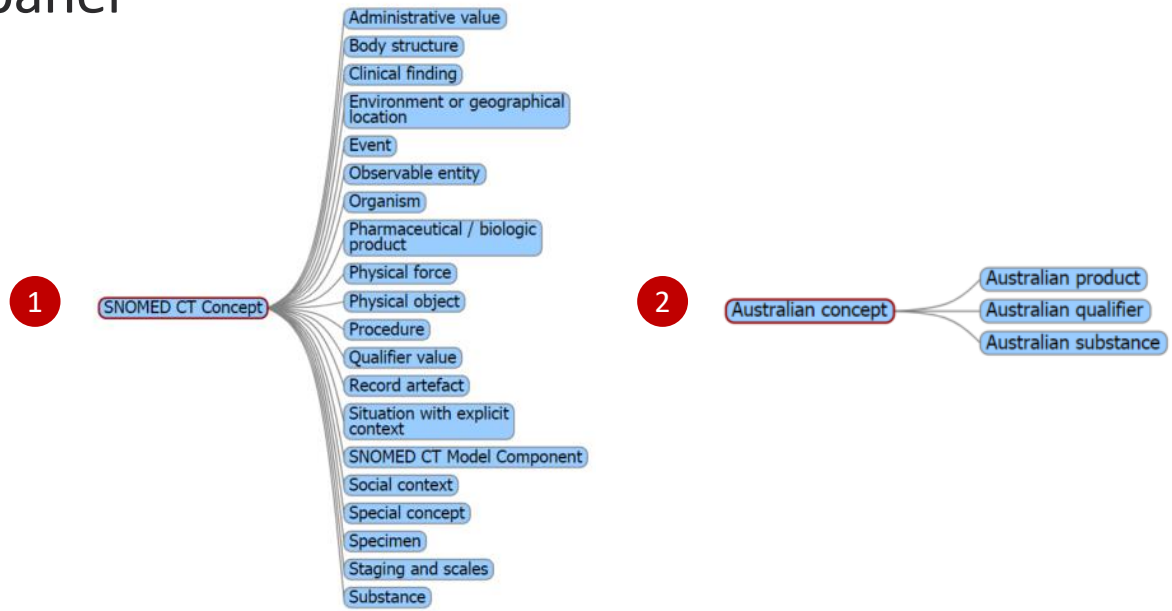
Search results can appear duplicated

- Multiple results may look the same because of the preferred term.
  1. See example 1, *Haemolysis*.
- However, each of these concepts is different in meaning and can be distinguished by the **Semantic tag** or **Hierarchy panel and Modelling view**.
  2. See example 2, *Tablet*.





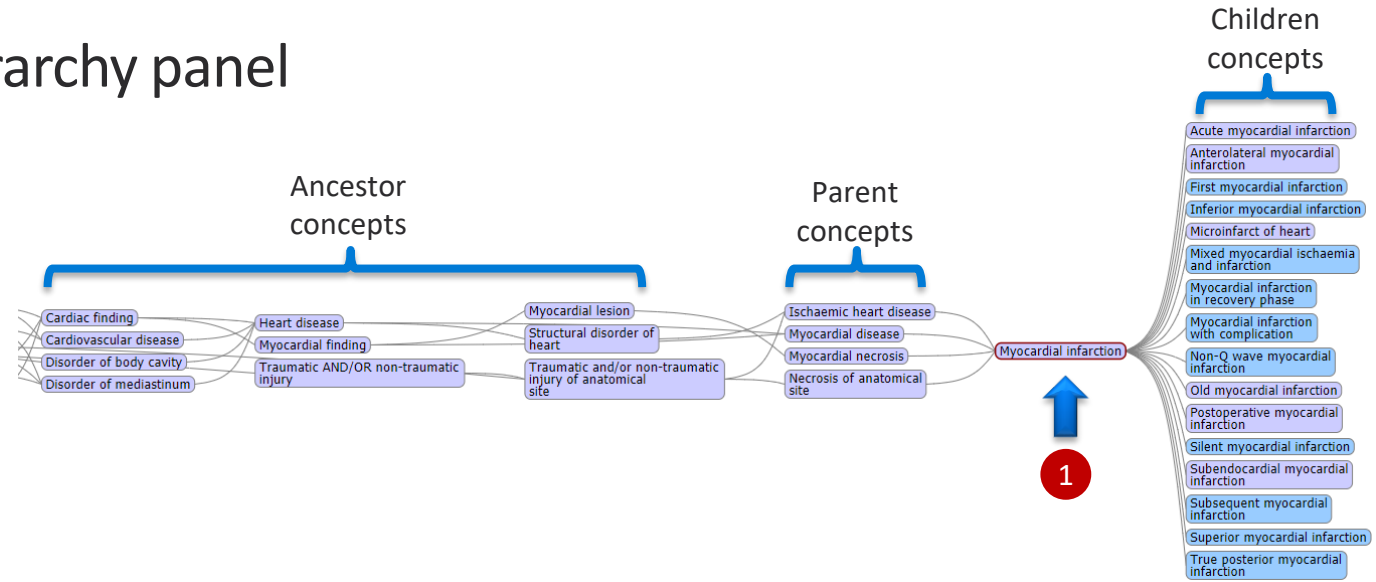
Hierarchy panel



Shows how concepts are linked together via the IS A relationship.

1. SNOMED CT-AU content is contained within |*SNOMED CT Concept*|.
2. Australian Medicines Terminology (AMT) content is contained within |*Australian concept*|.

Hierarchy panel

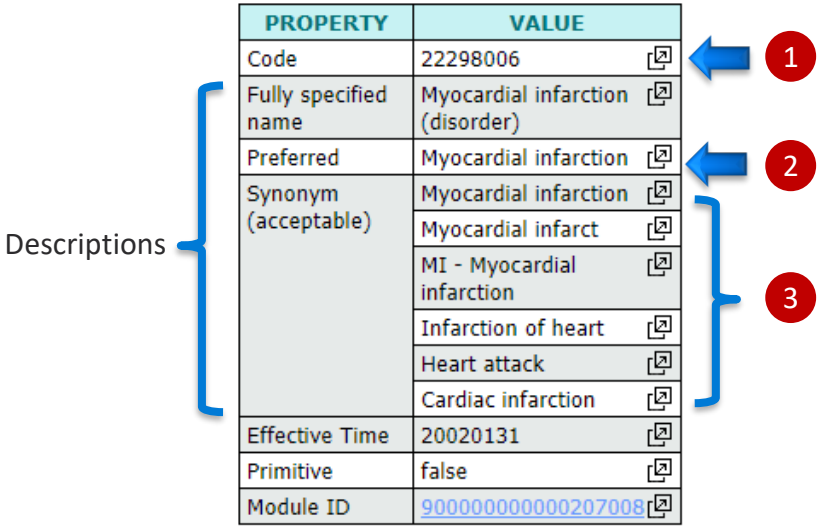


1. The selected concept of |*Myocardial infarction*|, with its immediate children (right) and all parents and ancestors (left).
   - Purple box = fully defined concept (all defining attributes are modelled).
   - Light blue box = primitive concept (some defining attributes not modelled).

Children concepts may have further descendants (to the right). Descendants can be found by clicking on each child concept displayed consecutively and “following” each branch.

Click on any of the boxes in the Hierarchy panel to select a different concept, display its properties, and move around the terminology.

Properties box



The properties of the selected concept of |*Myocardial infarction*| are shown in the diagram.

1. Code is the SNOMED CT or AMT identifier of the selected concept.
2. “Preferred” is the preferred way of naming the concept in Australia.
3. Synonyms are other ways of naming the concept.

Code, descriptions, effective time, primitive and module ID are available for all concepts.
All entries in the Properties box can be copied & pasted, or dragged & dropped, into another application.

Properties box

PROPERTY	VALUE
Code	123178004
Fully specified name	Annual (qualifier value)
Preferred	Annual
Synonym (acceptable)	Annual
Effective Time	20020131
Primitive	false
Inactive	true
Module ID	900000000000207008
Replaced By	53281000

1

2

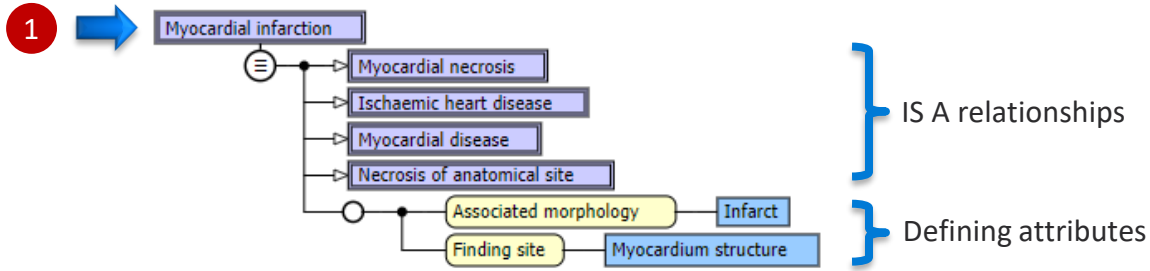
PROPERTY	VALUE
Code	69505011000036107
Fully specified name	Paroven Forte (oxerutins 500 mg) uncoated tablet, 60 tablets, blister pack (containered trade product pack)
Preferred	Paroven Forte 500 mg uncoated tablet, 60, blister pack
Synonym (acceptable)	Paroven Forte 500 mg uncoated tablet, 60, blister pack
	Paroven Forte (hydroxyethylrutosides 500 mg) uncoated tablet, 60 tablets, blister pack
Effective Time	20090630
Primitive	false
Module ID	900062011000036108
ARTG Id	52171

3

Additional properties are available in certain circumstances:

1. The inactive property is only shown for inactive concepts.
2. Inactive concepts may be replaced by, or are possibly equivalent to, other concepts. Replacement concepts are clickable.
3. ARTG Id is only shown for AMT Containered Trade Product Pack (CTPP) concepts that have an associated ARTGID.

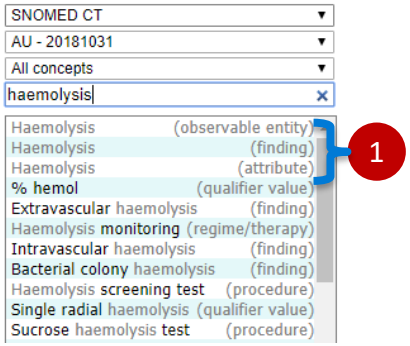
Modelling view

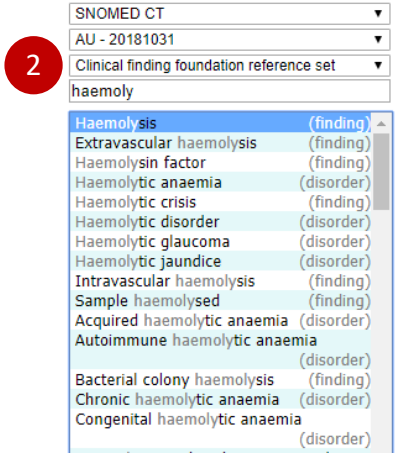


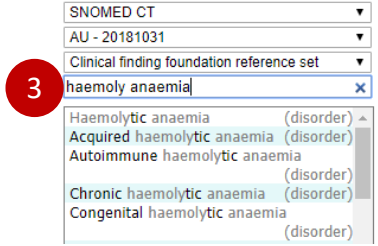
1. The selected concept of |*Myocardial infarction*|, with the modelling based on SNOMED CT diagramming notation, showing IS A relationships and defining attributes.
   - Purple box = fully defined concept (all defining attributes are modelled).
   - Light blue box = primitive concept (some defining attributes not modelled).
   - Yellow box = attribute relationship.

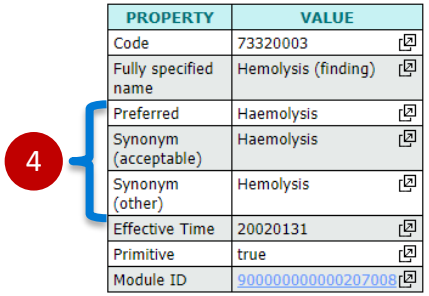
Click on any of the boxes in the Modelling view to select a different concept, display its properties, and move around the terminology.

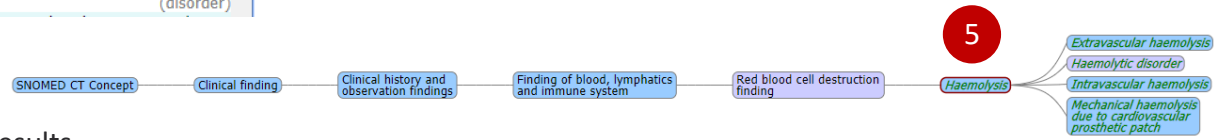
How to find the right concept

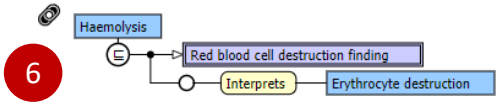












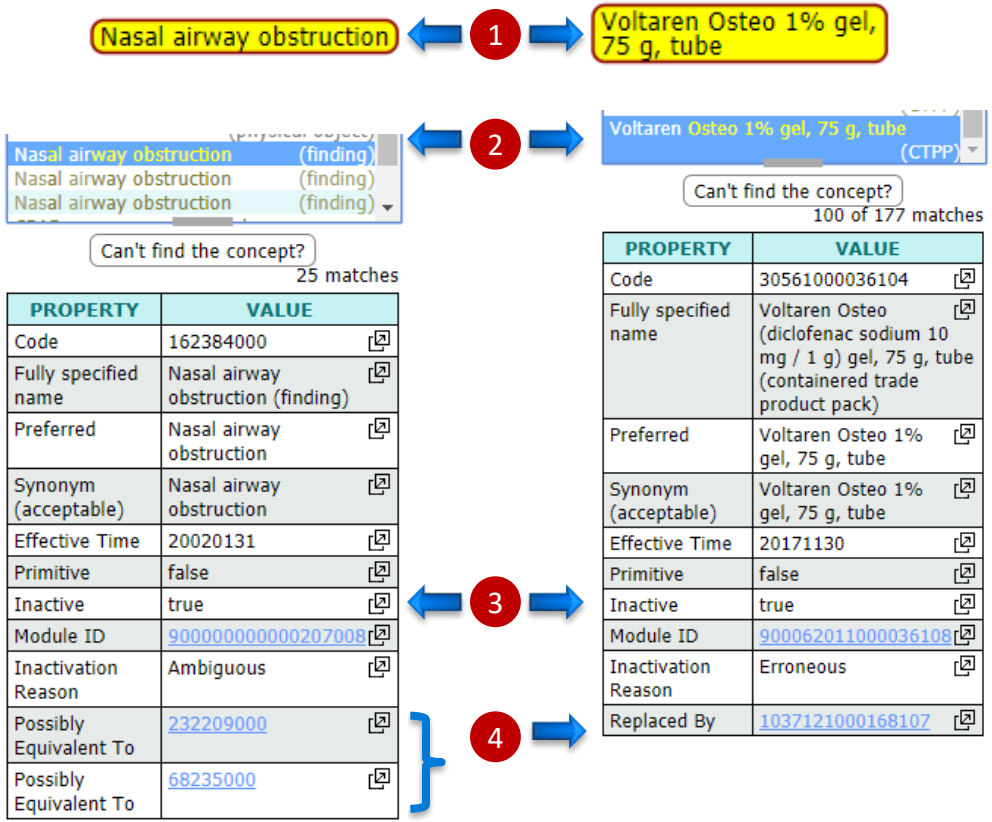
After typing in some search terms…

1. Check the semantic tags of the search results.
2. Filter on a reference set.
3. Add to or change your search terms.
   - Remember there can be spelling or word variants in SNOMED CT.
4. Look at the Properties box (i.e. check the descriptions).
5. Look at the Hierarchy panel (i.e. check ancestors and descendants).
6. Look at the Modelling view.

Inactive concepts

- When found, do NOT use inactive concepts. They are not recommended for clinical use
- Note: When a reference set is selected in the filter, only active concepts are displayed in Search.

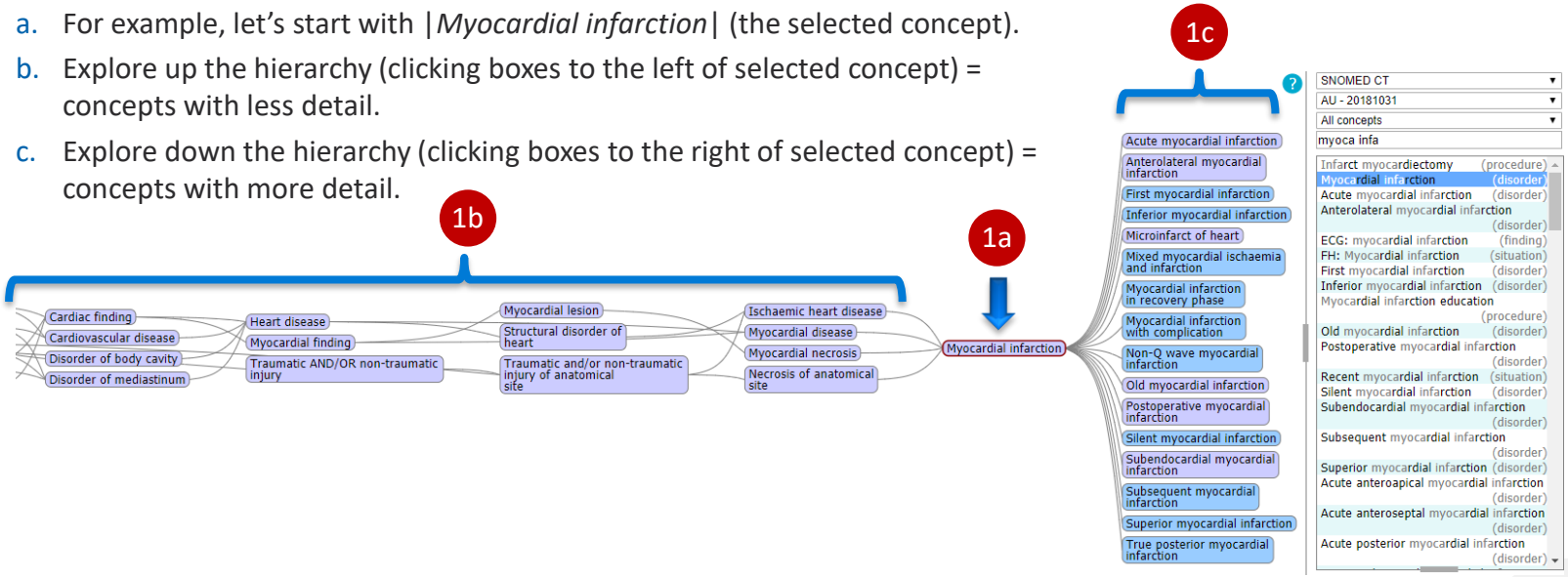
1. The concept is coloured yellow in the Hierarchy panel, with no ancestors or descendants displayed. The Modelling view is also not available.
2. Inactive concepts are displayed in yellow text in the search results.
3. The property inactive = true.
4. Alternative concepts that are currently active may be suggested, and are clickable.
   - E.g. |*Nasal airway obstruction*| has two possible active replacements
   - Clicking on “68235000” refreshes the hierarchy panel, modelling view and properties box change to reflect the active replacement concept |*Nasal congestion*|.
   - If this is not the right concept, go back and click on the “232209000” link to check if |*Nasal obstruction*| is more suitable.



Using the Hierarchy panel to explore SNOMED CT-AU content

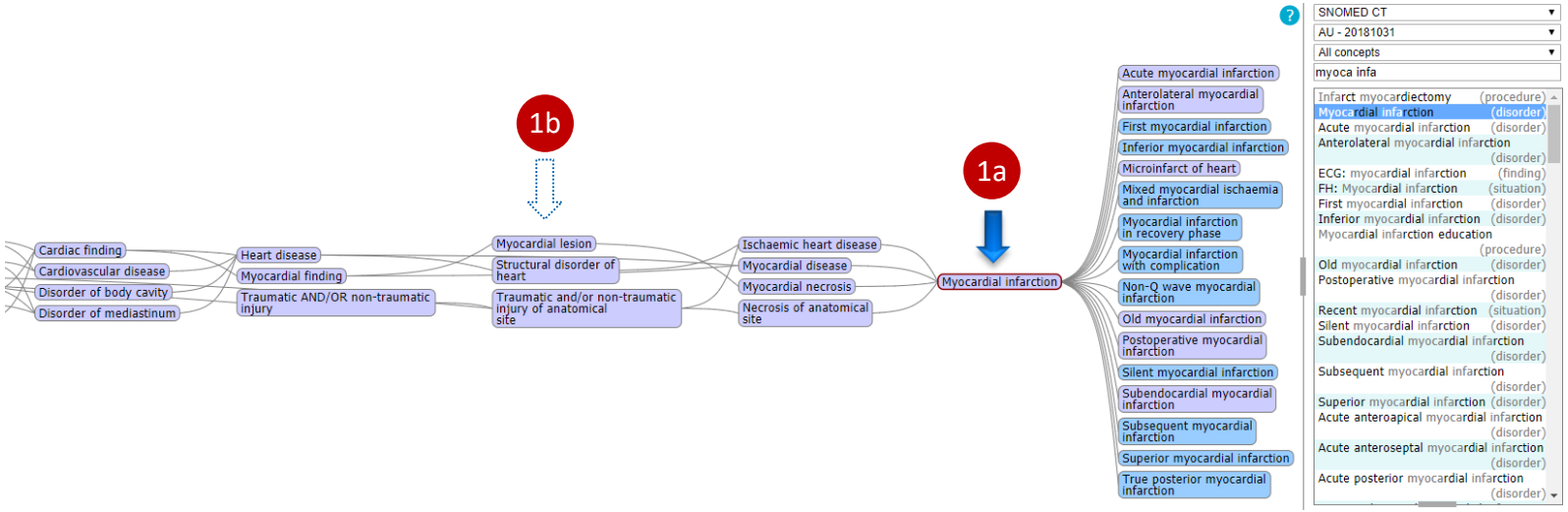
Exploring SNOMED CT-AU content in the Hierarchy panel

1. A good way to explore SNOMED CT-AU content is to type in some search terms, select a concept from search results, and then click on the various boxes to the left or right in the Hierarchy panel. In other words, by exploring up or down the hierarchy of concepts.
   a. For example, let's start with |*Myocardial infarction*| (the selected concept).
   b. Explore up the hierarchy (clicking boxes to the left of selected concept) = concepts with less detail.
   c. Explore down the hierarchy (clicking boxes to the right of selected concept) = concepts with more detail.



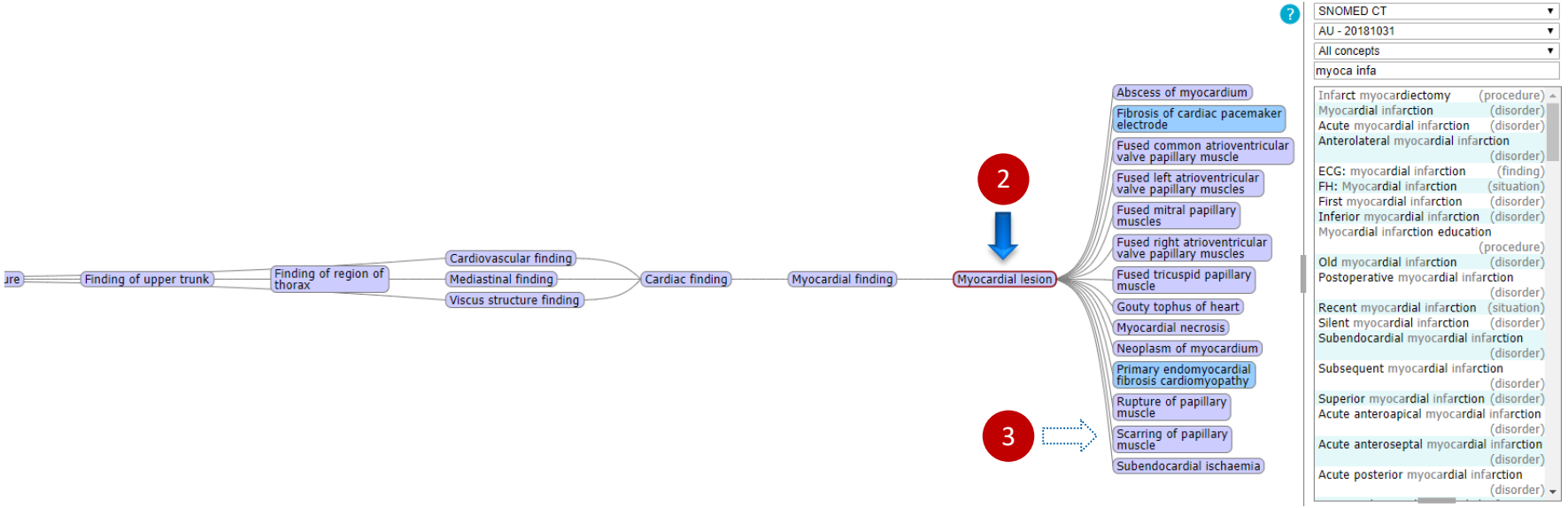
Exploring up the hierarchy – parents and ancestors

1. Exploring the ancestors of a selected concept.
   a. Let's start with |*Myocardial infarction*| (the selected concept).
   b. The ancestor |*Myocardial lesion*| may be of interest to explore this branch.



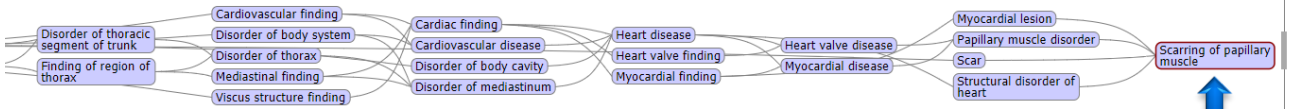
Exploring up the hierarchy – parents and ancestors (cont.)

2. The concept |*Myocardial lesion*| is selected. It has 14 child concepts.
3. Exploring further, one of its child concepts |*Scarring of papillary muscle*| may be of interest.



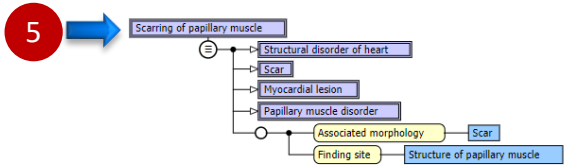
Exploring up the hierarchy – parents and ancestors (cont.)

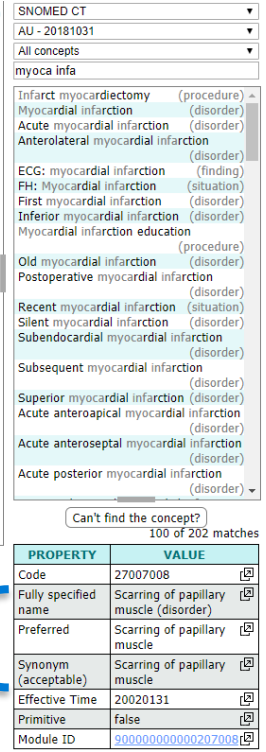
4. The concept |*Scarring of papillary muscle*| is selected as the final concept.
   - It has no children concepts, therefore it is the most specific concept found in this particular branch.



4

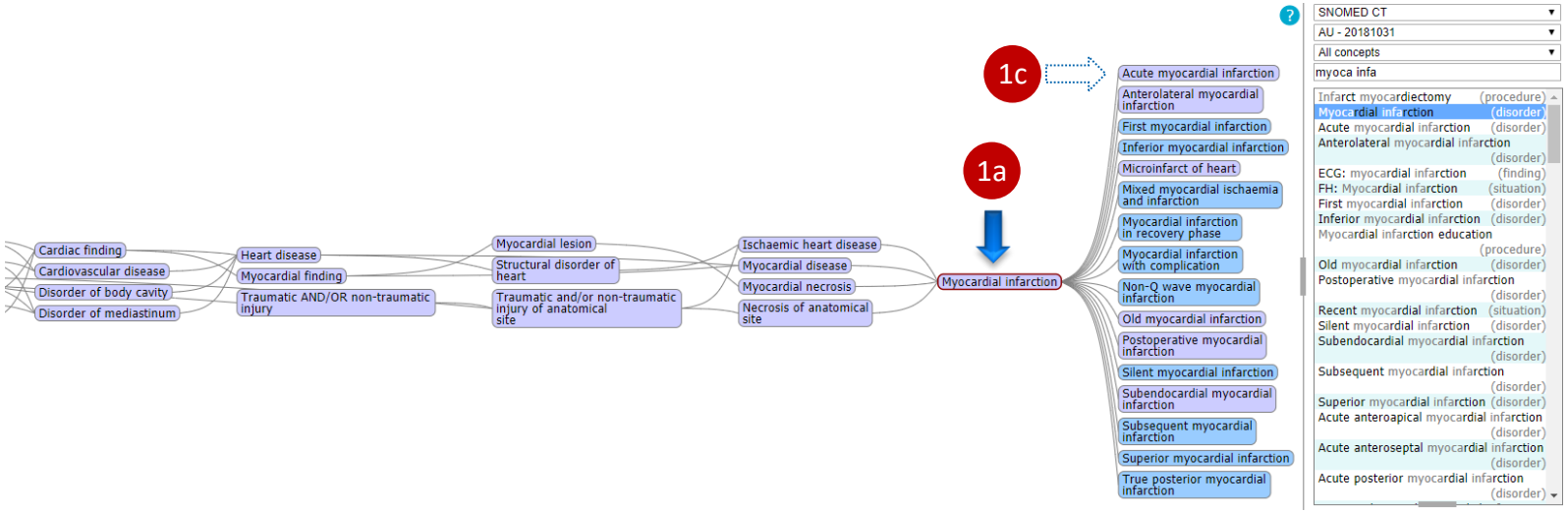
5. Also check the descriptions and modelling, to ensure selection of the correct concept.





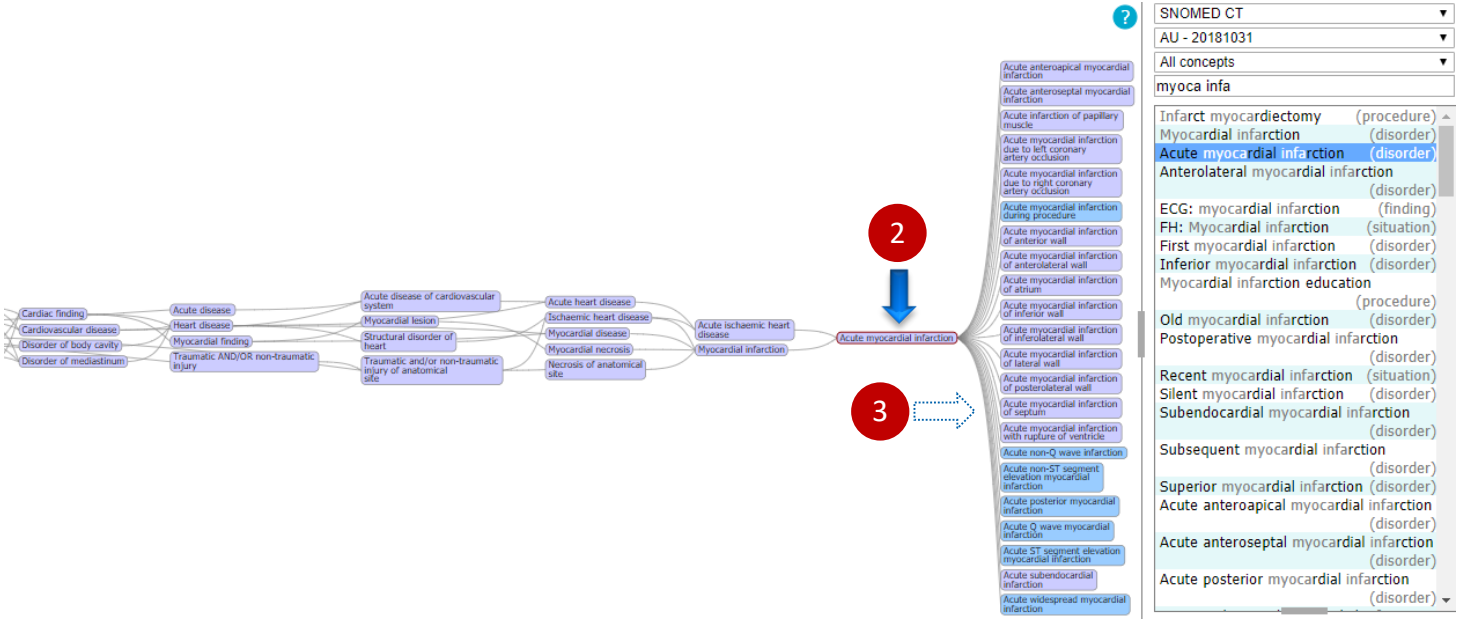
Exploring down the hierarchy – children and descendants

1. Exploring the descendants of a selected concept.
    a. Going back to |*Myocardial infarction*| (the selected concept).
    c. The child |*Acute myocardial infarction*| may be of interest.



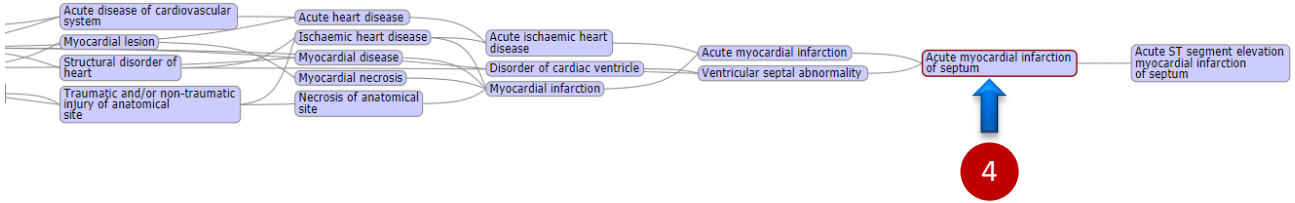
Exploring down the hierarchy – children and descendants (cont.)

2. The concept |*Acute myocardial infarction*| is selected, which has 22 children.
3. Exploring further, the child concept |*Acute myocardial infarction of septum*| may be of interest.

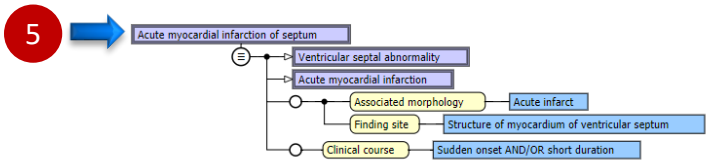


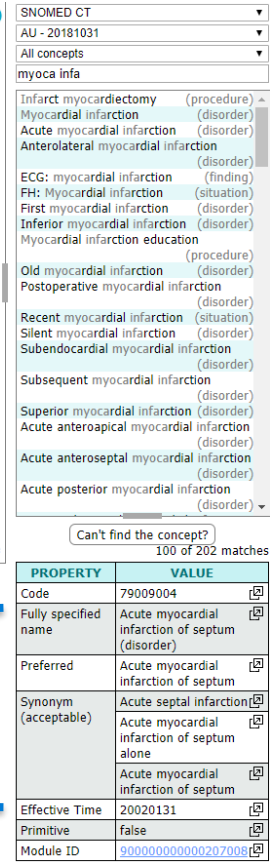
Exploring down the hierarchy – children and descendants (cont.)

4. The concept |*Acute myocardial infarction of septum*| is selected as the final concept.
   - In this fictional example, the single child concept |*Acute ST segment elevation myocardial infarction of septum*| has additional detail which is not of interest.



5. Also check the descriptions and modelling, to ensure selection of the correct concept.





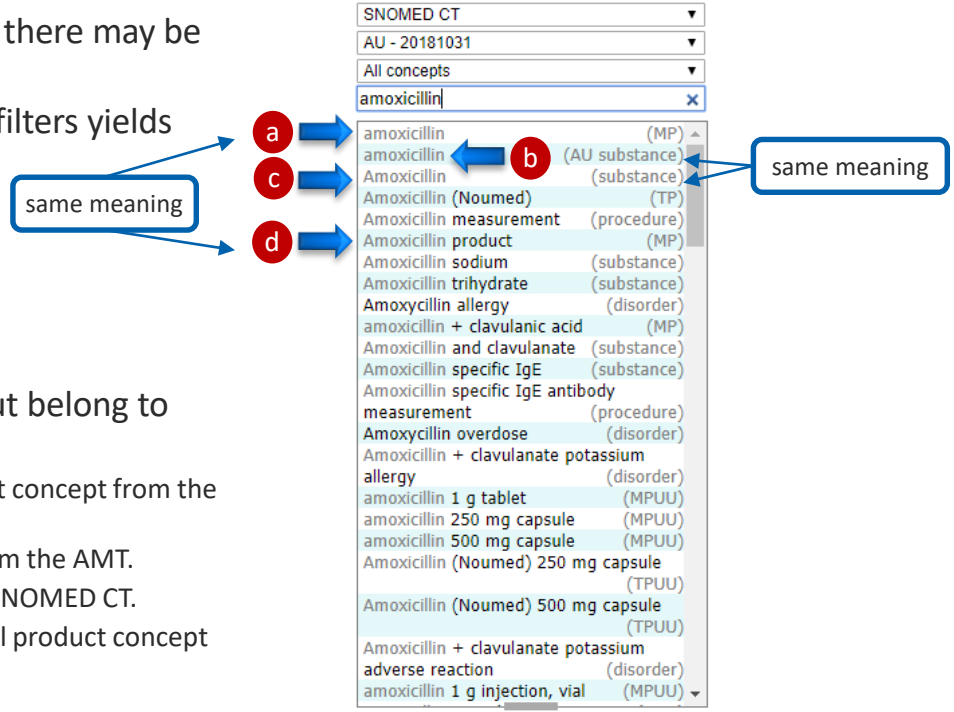
PROPERTY	VALUE
Code	79009004
Fully specified name	Acute myocardial infarction of septum (disorder)
Preferred	Acute myocardial infarction of septum
Synonym (acceptable)	Acute septal infarction Acute myocardial infarction of septum alone Acute myocardial infarction of septum
Effective Time	20020131
Primitive	false
Module ID	900000000000207008

5

Searching medicinal content in the AMT

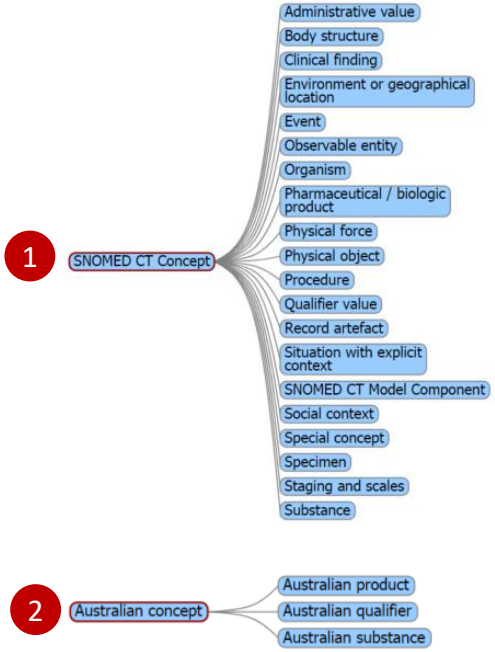
Medicinal content in SNOMED CT and the AMT

- When browsing for medicinal content in Shrimp, there may be concepts that appear to be duplicated.
- For example, searching for “amoxicillin” with no filters yields many results that include:
  - Medicinal products (MP).
  - Substances.
  - Procedures.
  - Disorders.
  - AMT trade product concepts.
- Some of these results have the same meaning but belong to different hierarchies. For example:
  a. |*amoxicillin (medicinal product)*| is a medicinal product concept from the AMT.
  b. |*amoxicillin (AU substance)*| is a substance concept from the AMT.
  c. |*Amoxicillin (substance)*| is a substance concept from SNOMED CT.
  d. |*Amoxicillin product (medicinal product)*| is a medicinal product concept from SNOMED CT.



Why do SNOMED CT and the AMT have similar medicinal content?

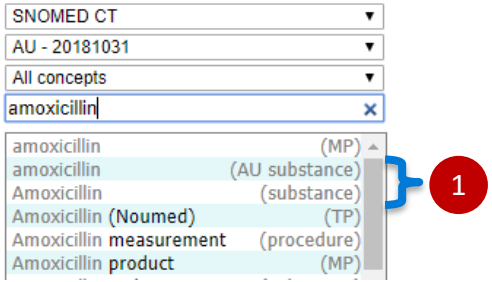
- The AMT describes commonly used medicines in Australia and supports electronic medication management.
- It was developed independently of SNOMED CT, while still conforming to these specifications.
  1. SNOMED CT-AU content is contained within the root concept |*SNOMED CT Concept*|.
  2. AMT content is contained within the root concept |*Australian concept*|.
- Integration of the AMT with SNOMED CT-AU content is in progress.
  - When completed, duplicate AMT concepts will be inactivated, and the corresponding SNOMED CT-AU concept will be recommended for use.



How to differentiate between SNOMED CT and the AMT

There are many ways to differentiate between SNOMED CT and the AMT, for example the |*amoxicillin*| substances.

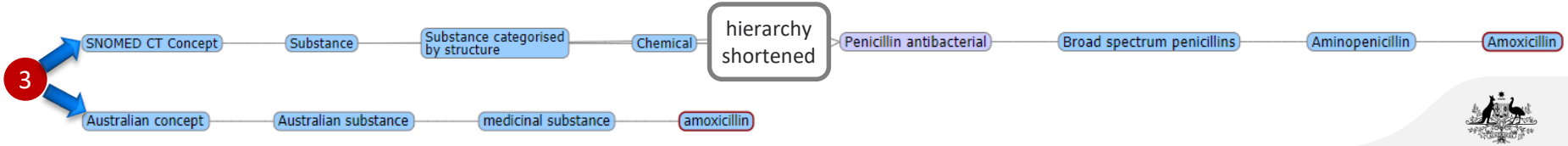
1. The semantic tag **(AU substance)** instead of **(substance)**
2. A code that contains the string "**1000036**" or "**1000168**" describes a SNOMED CT-AU or AMT concept, while a code without these strings describes a SNOMED CT concept.
3. The Hierarchy panel root concept of **|*Australian concept*|** instead of **|*SNOMED CT Concept*|**.



PROPERTY	VALUE
Code	1799011000036105
Fully specified name	amoxicillin (AU substance)
Preferred	amoxicillin
Synonym (acceptable)	amoxycillin
	amoxicillin
Effective Time	20090630
Primitive	true
Module ID	900062011000036108

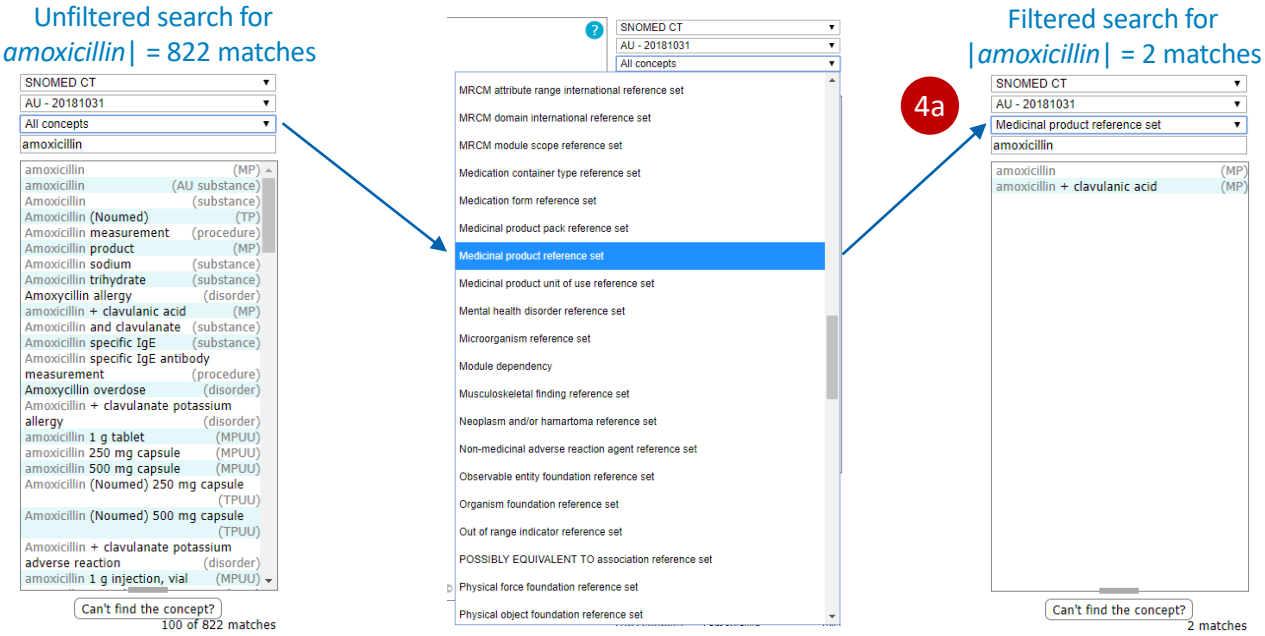
2

PROPERTY	VALUE
Code	372687004
Fully specified name	Amoxicillin (substance)
Preferred	Amoxicillin
Synonym (acceptable)	Amoxicillin
Effective Time	20020731
Primitive	true
Module ID	900000000000207008



How to differentiate between SNOMED CT and the AMT

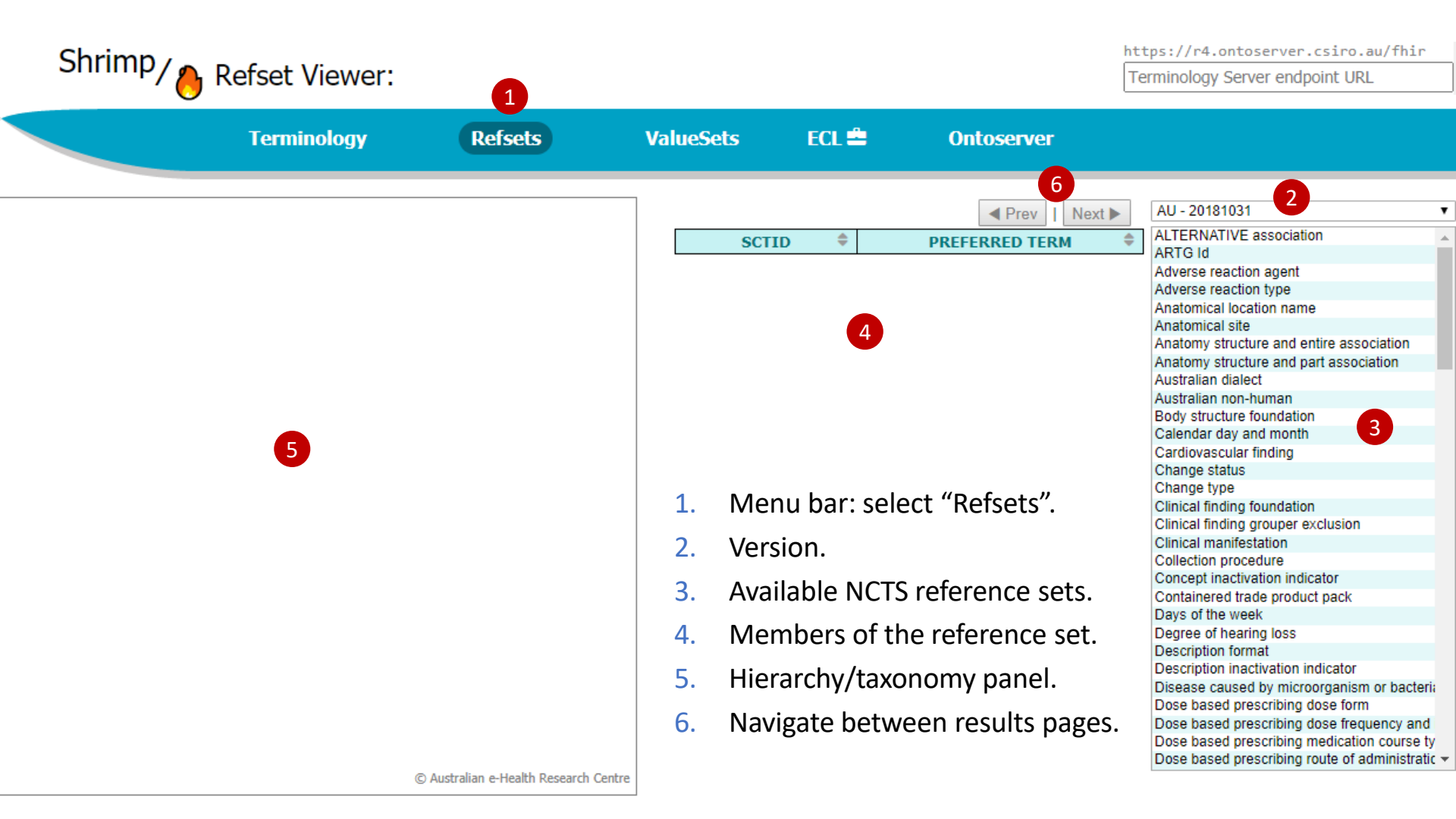
4. Applying a filter is a good way to retrieve only AMT product concepts. For example:
   a. Selecting “Medicinal product reference set” results in only AMT MP concepts.
   b. Selecting “Containered trade product pack reference set” results in only AMT CTPP concepts.



Refset Viewer

What are refsets?

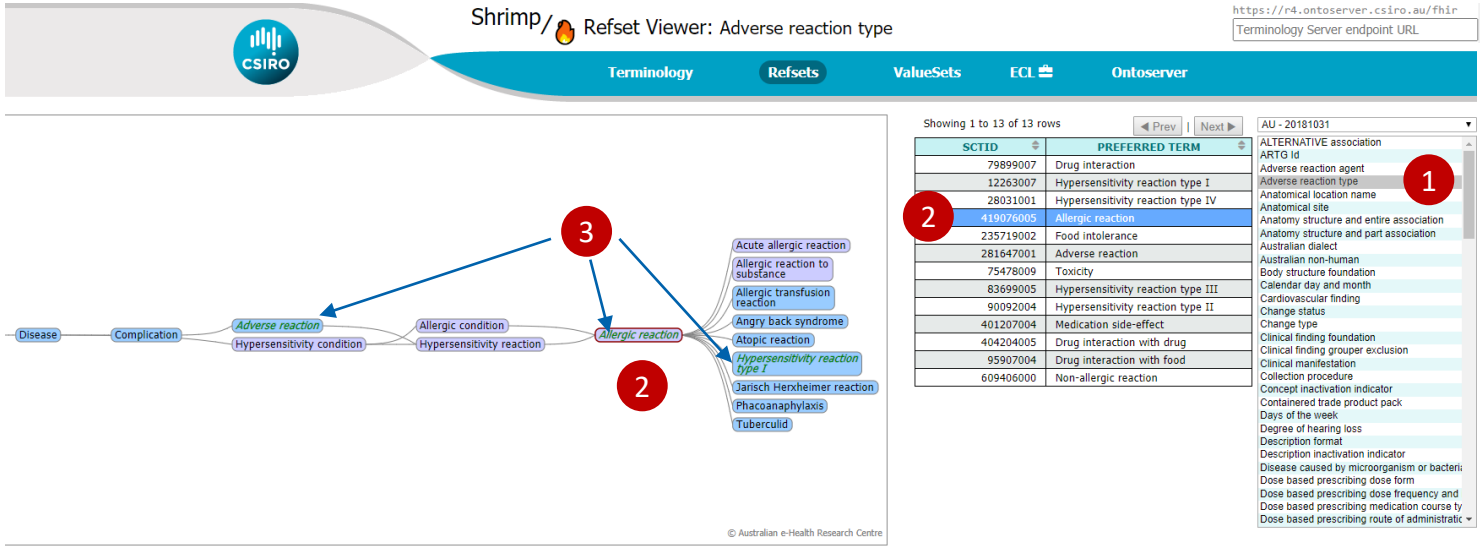
- A refset (contraction of “reference set”) is a smaller set of SNOMED CT-AU or AMT data designed for a specified use case.
- The most common type of refsets are subsets, but there are also mapping refsets and those that add non-defining information for SNOMED CT-AU and AMT content.
- The Refset Viewer in Shrimp is currently best suited to view subsets only.
- Refer to the SNOMED CT-AU Development Approach for Reference Sets in the NCTS document library.
  - Provides a list of refsets available from the NCTS.
  - Describes why and how the refsets were developed, along with some example content.
- Refset information is also available on the NCTS Access page.



1. Menu bar: select “Refsets”.
2. Version.
3. Available NCTS reference sets.
4. Members of the reference set.
5. Hierarchy/taxonomy panel.
6. Navigate between results pages.

Example: Viewing the *Adverse reaction type reference set*

1. Select a reference set from the dropdown to view its members.
2. Click on a member/ concept to bring up the hierarchy view.
3. The concepts in green text are also members of the selected reference set.



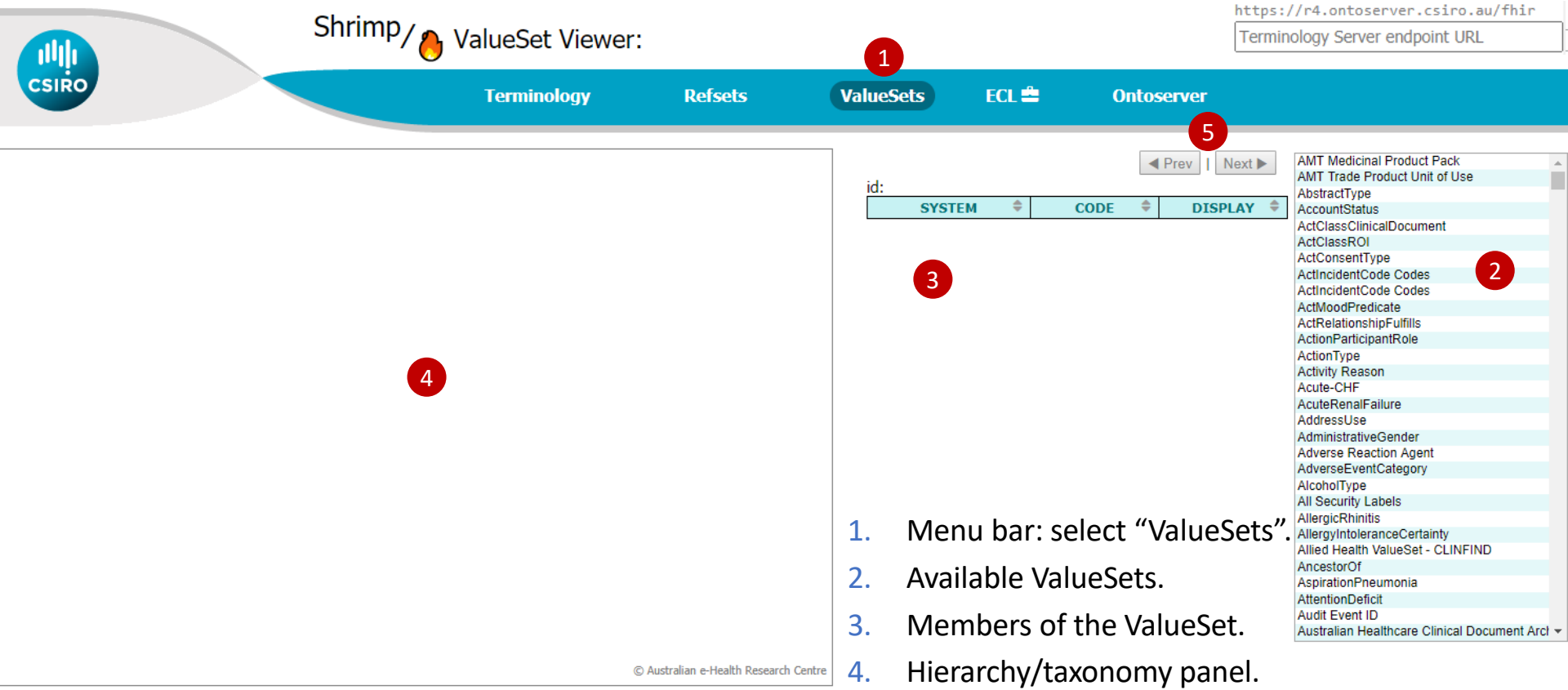
ValueSet Viewer

What are ValueSets?

- A ValueSet is a type of HL7 FHIR® resource.
- A ValueSet specifies a list of codes taken from one or more FHIR® CodeSystems, for a particular use.
- A ValueSet is similar to an NCTS reference set, except it conforms to the FHIR® specification.
- Read more about FHIR® and ValueSets - https://www.hl7.org/fhir/valueset.html

Shrimp ValueSet Viewer:

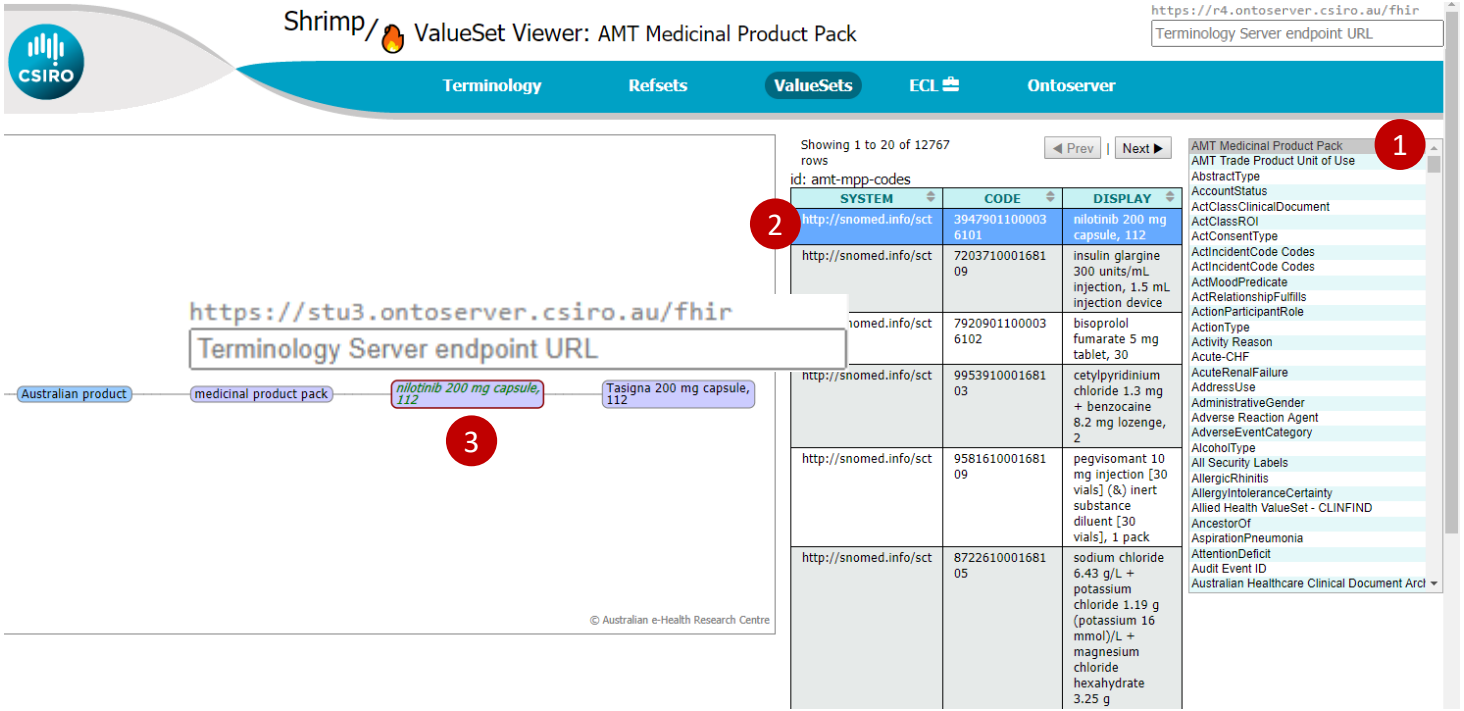
- Still under construction so some errors may be displayed.
- Many of the ValueSets listed are of test data only.



1. Menu bar: select “ValueSets”.
2. Available ValueSets.
3. Members of the ValueSet.
4. Hierarchy/taxonomy panel.
5. Navigate between results pages.

Example: Viewing the AMT Medicinal Product Pack ValueSet

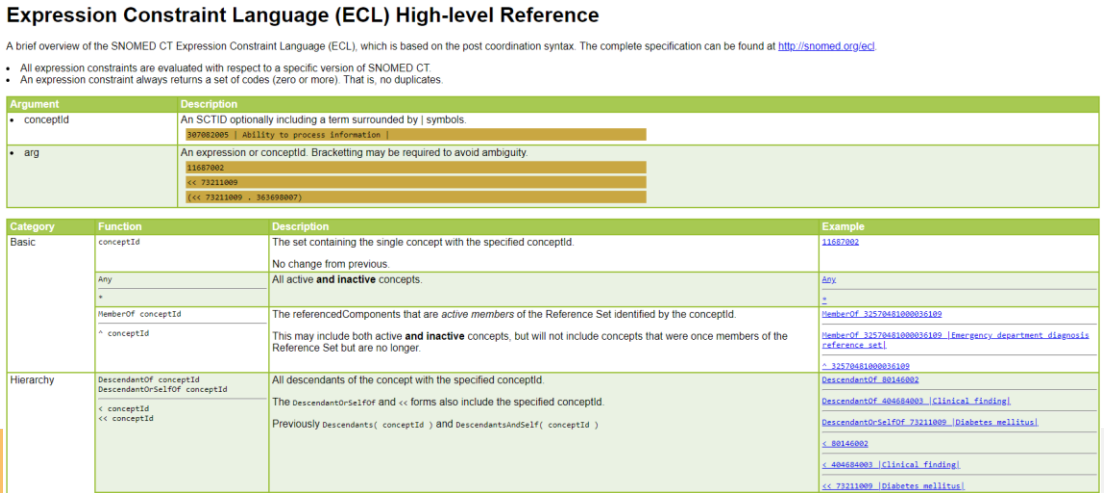
1. Select a value set from the dropdown to view the members.
2. Click on a member/ concept to bring up the hierarchy view
3. The concepts in green text are members of the selected value set.



SNOMED ECL Builder

What is Expression Constraint Language (ECL)?

- A computer processable language that allows searching for concepts using their structure and attributes.
- Developed specifically to work with SNOMED CT content.
- Can be used to:
  - Explore and analyse SNOMED CT content.
  - Create a simple subset of concepts which eases the burden of maintaining the reference set.
  - Bind SNOMED CT concepts to an information model.
- Read more about ECL and some example functions - https://ontoserver.csiro.au/shrimp/ecl_help.html



Expression Constraint Language (ECL) High-level Reference

A brief overview of the SNOMED CT Expression Constraint Language (ECL), which is based on the post coordination syntax. The complete specification can be found at http://snomed.org/ecl.

- All expression constraints are evaluated with respect to a specific version of SNOMED CT.
- An expression constraint always returns a set of codes (zero or more). That is, no duplicates.

Argument	Description
• conceptId	An SCTID optionally including a term surrounded by | symbols. `307082005 | Ability to process information |`

• arg	An expression or conceptId. Bracketting may be required to avoid ambiguity.
	`11687002`
	`<< 73211009`
	`(<< 73211009 . 363698007)`

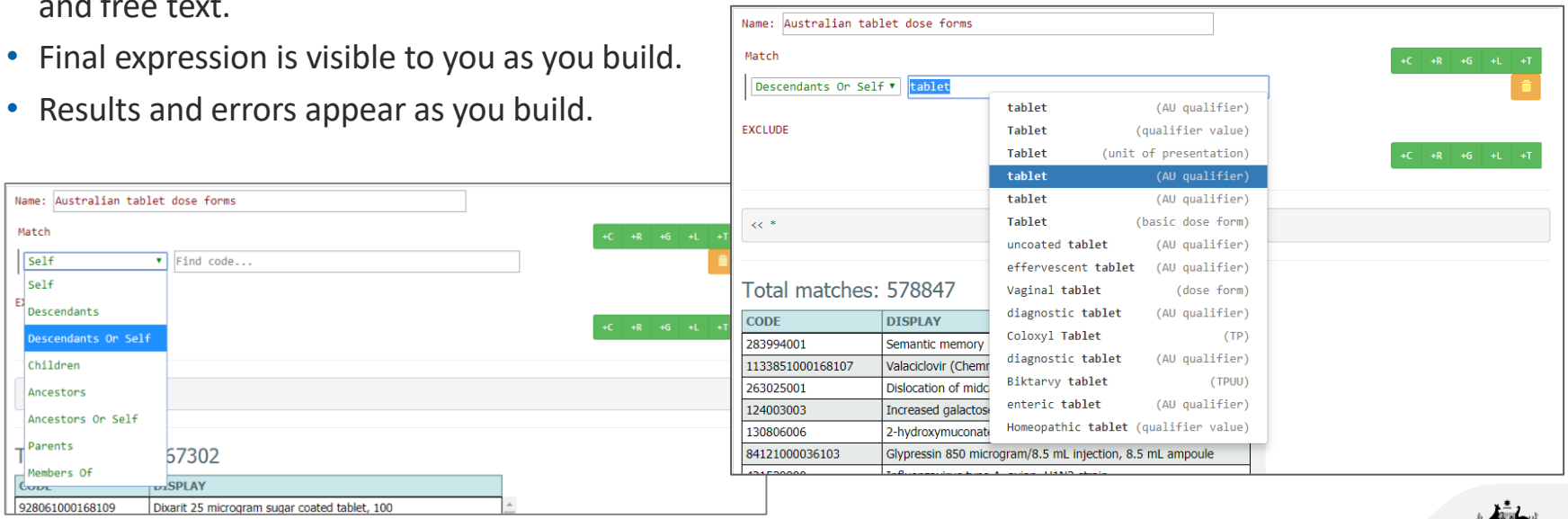
Category	Function	Description	Example
Basic	`conceptId`	The set containing the single concept with the specified conceptId. No change from previous.	`11687002`
	`Any` `*`	All active **and inactive** concepts.	`Any` `*`

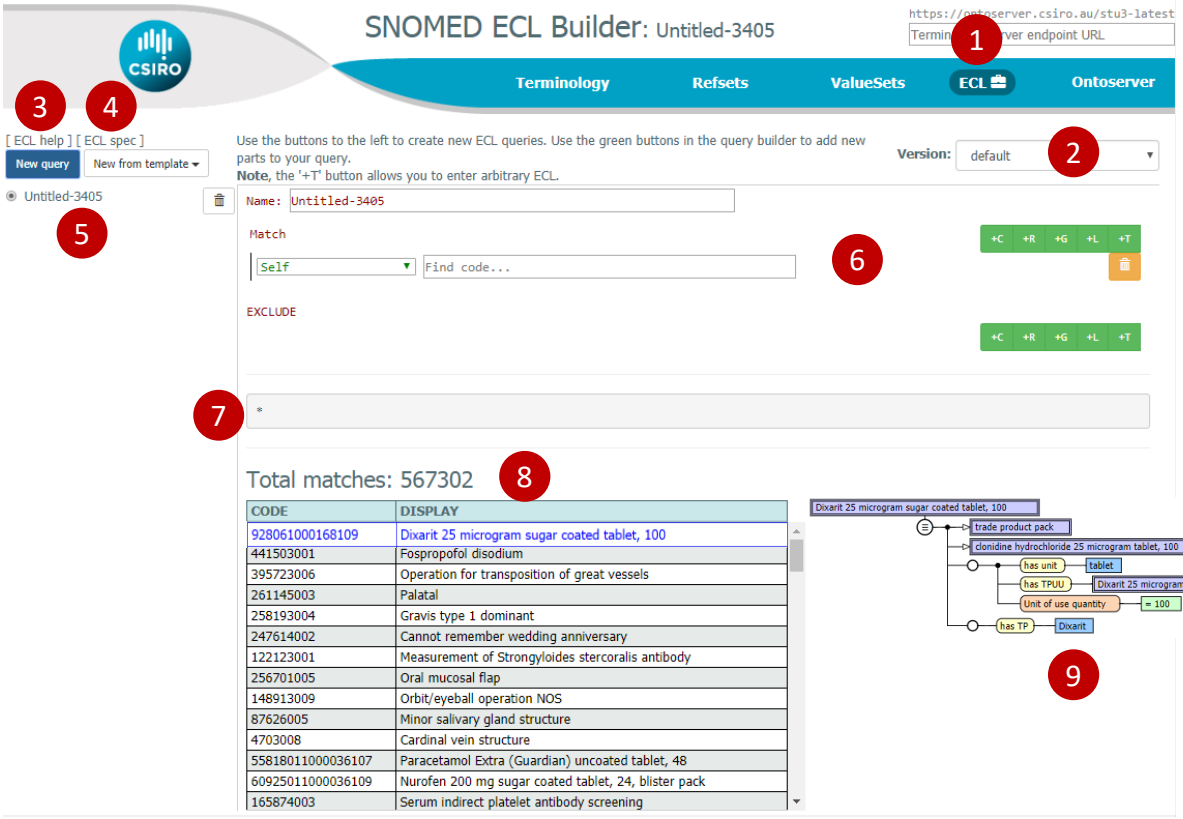
	`MemberOf conceptId`
	`^ conceptId`
		The referencedComponents that are *active members* of the Reference Set identified by the conceptId.
		This may include both active **and inactive** concepts, but will not include concepts that were once members of the Reference Set but are no longer.
			`MemberOf 32570481000036109`
			`MemberOf 32570481000036109 |Emergency department diagnosis reference set|`
			`^ 32570481000036109`

Hierarchy	`DescendantOf conceptId`
	`DescendantOrSelfOf conceptId`
	`< conceptId`
	`<< conceptId`
		All descendants of the concept with the specified conceptId.
		The `DescendantOrSelfOf` and `<<` forms also include the specified conceptId.
		Previously `Descendants( conceptId )` and `DescendantsAndSelf( conceptId )`
			`DescendantOf 80146002`
			`DescendantOf 404684003 |Clinical finding|`
			`DescendantOrSelfOf 73211009 |Diabetes mellitus|`
			`< 80146002`
			`< 404684003 |Clinical finding|`
			`<< 73211009 |Diabetes mellitus|`

Features of the Shrimp SNOMED ECL Builder

- Create new queries from scratch or existing templates, to build your own library.
- Select operators from dropdown lists, and enter concepts by typing in the description.
- Buttons to add concepts, refinements, groupings, linked subquery (i.e. queries that are in your library), and free text.
- Final expression is visible to you as you build.
- Results and errors appear as you build.



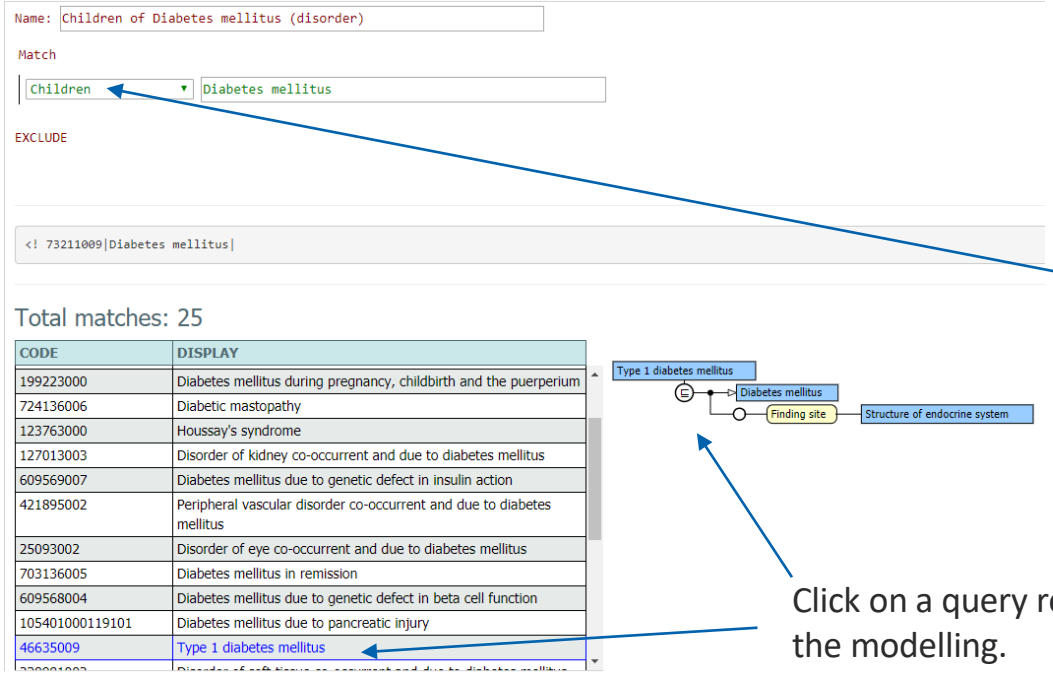


1. Ensure ECL is selected on the menu bar.
2. Select SNOMED CT-AU version (defaults to current release).
3. “ECL help” provides a guide to most ECL functions and examples of each.
4. “ECL spec” describes the detailed SNOMED CT ECL specifications.
5. Create new queries from scratch or templates to build your own library.
6. Build the query.
   - Hover over each green button to see its function
7. The actual ECL expression.
8. Number of results and results table.
9. Modelling for the concept selected in the results table (blue text).

https://ontoserver.csiro.au/shrimp/ecl/?fhir=https://r4.ontoserver.csiro.au/fhir

Example 1 – A simple SNOMED CT-AU query

- Find all children of |*Diabetes mellitus (disorder)*|.



This results in only the immediate children of the |*Diabetes mellitus (disorder)*| concept, and not the further descendants.

Click on a query result to display the modelling.

Example 2 – A complex AMT query using subqueries

- List all **single** Containered trade product packs (CTPPs) that contain amoxicillin.

3 steps to build:

1. Create a query that uses the free text field to find the ingredients of the amoxicillin MP.
2. Create another query that finds the descendants of amoxicillin MP that only have the ingredients specified in (1).
3. Find CTPPs that only have TPUUs resulting from (2).

Example 2 – A complex AMT query using subqueries

Name: CTPPs that only contain amoxicillin

Match

+C +R +G +L +T

Members Of | Contained trade product pack reference set

none | Self | has TPUU | !=

Match

+C +R +G +L +T

Self | Descendants of amoxillin MP that only have that ingredient

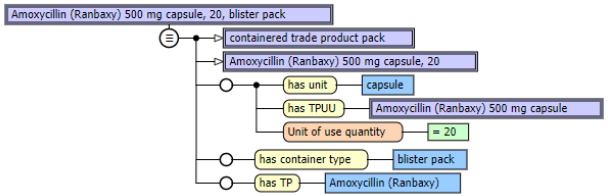
EXCLUDE

+C +R +G +L +T

```
^ 929360051000036108|Contained trade product pack reference set| : [0..0] 30409011000036107|has TPUU| != (
    (
    < 21415011000036100|amoxicillin| : [0..0] 700000081000036101|has intended active ingredient| != (
        (
          (21415011000036100.700000081000036101)
        )
    )
  )
)
```

Total matches: 113

CODE	DISPLAY
30606011000036100	Amoxil Sugar Free 125 mg/5 mL powder for oral liquid, 100 mL, bottle
73340011000036109	Amoxycillin (Ranbaxy) 500 mg capsule, 20, blister pack
1012681000168105	Amoxycillin (GN) 250 mg capsule, 20, blister pack
901941000168105	Amoxycillin (Watson) 250 mg capsule, 20, blister pack
59931000036107	Amoxycillin (PS) 500 mg capsule, 3, blister pack
74361000036100	Yomax 500 mg capsule, 20, blister pack
69347011000036107	Fisamox 500 mg powder for injection, 5 vials



This results in CTPP concepts that only have “amoxicillin (AU substance)” as an ingredient.

Questions?

Contact us

Help Centre	1300 901 001
Email	help@digitalhealth.gov.au
Website	healthterminologies.gov.au digitalhealth.gov.au
Twitter	twitter.com/AuDigitalHealth

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