

RxClass - Navigating between Drug Classes and RxNorm Drugs

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Motivation

Drug classes constitute important information about the drugs and are critical to important use cases, such as clinical decision support (e.g., for allergy checking). *RxNav*, our RxNorm browser, already displays the classes for RxNorm drugs, but its drug-centric perspective does not accommodate the exploration of drug classes. This is the reason why we developed a web-based companion browser, *RxClass*, which supports navigation between RxNorm drugs and drug classes from several sources, including ATC, MeSH, NDF-RT and Structured Product Labels from the Food and Drug Administration (FDA).

Drug Class Sources

The Anatomical Therapeutic Chemical drug classification (**ATC**) is a resource developed for pharmacoepidemiology purposes by the World Health Organization Collaborating Centre for Drug Statistics Methodology.

The Medical Subject Headings (**MeSH**), developed by the National Library of Medicine (NLM), provides a rich description of pharmacological actions for the purpose of indexing and retrieval of biomedical articles.

The National Drug File-Reference Terminology (**NDF-RT**), developed by the Department of Veterans Affairs, provides clinical information about drugs (therapeutic intent, mechanism of action, etc.) and integrates drug classes from FDA's Structured Product Labels.

The screenshot shows the RxClass interface. On the left, there is a "Class Browser" sidebar with a tree view of drug classes. The root node is "Anatomical Therapeutic Chemical (ATC1-4)". Other nodes include "ALIMENTARY TRACT AND METABOLISM (350)", "ANTIINFECTIVES FOR SYSTEMIC USE (282)", "ANTINEOPLASTIC AND IMMUNOMODULATING AGENTS (216)", "ANXIOLYTIC PRODUCTS, INSECTICIDES AND REPELLENTS (0)", "BLOOD AND BLOOD FORMING ORGANS (140)", "CARDIOVASCULAR SYSTEM (302)", "AGENTS ACTING ON THE RENIN-ANGIOTENSIN SYSTEM (32)", "ANTIHYPERTENSIVES (28)", "BETA BLOCKING AGENTS (25)", "BETA BLOCKING AGENTS (23)", "Alpha and beta blocking agents (2)", "Beta adrenergic receptor-selective (13)", "Beta blocking agents, selective (10)", "BETA BLOCKING AGENTS AND OTHER ANTIHYPERTENSIVES (0)", "BETA BLOCKING AGENTS AND OTHER DIURETICS (0)", "BETA BLOCKING AGENTS AND THIAZIDES (0)", "BETA BLOCKING AGENTS AND VASODILATORS (0)", "BETA BLOCKING AGENTS, THIAZIDES AND OTHER DIURETICS (0)". At the bottom of the sidebar, there is a link to "Established Pharmacologic Classes (EPC)".

The main area is titled "Source of drug-class relations". It shows a search bar with "Alpha and beta blocking agents" and a dropdown menu "by class name" or "by RxNorm drug name". Below the search bar, it says "class: Alpha and beta blocking agents / id: C07AG / class type: ATC1-4 / show context". A table lists two entries:

Type	RXUI	RxNorm Name	Source Id	Source Name	Relation	All classes
IN	20352	carvedilol	C07AG02	carvedilol	DIRECT	Show
IN	6185	Labetalol	C07AG01	labetalol	DIRECT	Show

Figure 1. Sample screenshot of RxClass

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Linking RxNorm Drugs to Drug Classes

Like *RxNav*, *RxClass* is supported by functions from an application programming interface (API), which can be used independently for integrating drug class information in programs. The API serves the latest information available from the drug information sources.

RxClass provides a graphical interface to explore the hierarchical class structures of each source and examine the corresponding RxNorm drug members for each class. Some features of *RxClass*:

- The user can navigate through the drug classes via the hierarchical menu, or use the search feature to identify a drug class or RxNorm drug.
- Drug class member results can be saved to a file in several different formats.
- Users of *RxNav* can link to *RxClass* to get class members.

A sample screenshot of *RxClass* is shown in Figure 1.

Conclusions

Providing drug class members has long been a missing piece of information in *RxNav*. With *RxClass*, we now provide a link between drug classes from various sources and RxNorm drugs.

RxClass is available from the main *RxNav* website (<http://rxnav.nlm.nih.gov>), along with additional information about *RxNav* and our APIs to various drug information sources.