RxClass – Navigating between Drug Classes and RxNorm Drugs

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Abstract— Objectives: To demonstrate RxClass, a web interactive browser to explore the relationships between RxNorm drugs and drug classes from several sources including ATC, MeSH and NDF-RT. RxClass is publicly available at: http://mor.nlm.nih.gov/RxClass/

I. 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).

II. SOURCES OF CLASS TYPES AND DRUG-CLASS RELATIONS
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 and contains FDA Established Pharmacologic Classification (EPC), Disease classification, Chemical Structure and Classification (Chem), Mechanism of Action (MOA), Physiologic Effects (PE) and Pharmacokinetics (PK) class types.

ATC and MeSH provide both the vocabulary for drug classes and the drug-class membership relations. In contrast, as shown in Table 1, several sources (DailyMed, FDASPL and NDF-RT) provide drug-class membership relations in reference to the NDF-RT vocabulary for classes. All drugs are normalized to RxNorm.

III. RXCLASS INTERFACE
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 (Figure 1).
- RxClass supports the exploration of all classes for a given drug across multiple classifications (Figure 2).
- RxClass contains an autocomplete function which will help identify class or drug names in search mode, as well as spelling suggestions for misspelled drug and class names during search.

<table>
<thead>
<tr>
<th>Class Type</th>
<th>Source of Drug-Class Relations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATC</td>
<td>MeSH DailyMed FDASPL NDF-RT</td>
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<tr>
<td>MeSH</td>
<td>X</td>
</tr>
<tr>
<td>Chem</td>
<td>X X X</td>
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<td>Disease</td>
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<td>EPC</td>
<td>X X X</td>
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<td>PE</td>
<td>X X X</td>
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<tr>
<td>PK</td>
<td>X</td>
</tr>
</tbody>
</table>

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Fig. 1. Drugs from the ATC class *Beta blocking agents, selective*, with the ATC hierarchy of classes on the left navigation pane and the list of RxNorm drug members on the right.

Fig. 2. Membership of the drug *Acebutolol* to drug classes from various sources.