

Theater-Style Demonstration  
*S45 – Expressing Terminologies for Practical Use*  
November 13, 2006



# RxNav

## *Providing Standard Drug Information*

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# Outline

- Drug vocabulary standardization: **RxNorm**
- Visualization and processing of drug information: **RxNav**
- Future work: **integrated drug information**



# Drug vocabulary standardization

*RxNorm*



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# Motivation

- Exchange of information requires standardized names
  - Ordering drugs
  - Checking interactions
  - Inventory management
- No standard naming conventions for drugs



# Concepts

- Integrating terms from various drug vocabularies
- Unique identifiers for concepts (RXCUI)

RXCUI	STR	SAB
161	Acetaminophen	RxNorm
161	APAP	MMSL
161	Paracetamol	SNOMEDCT
...		



# Normalized forms

**Strength**

4mg/ml

**Ingredient**

Fluoxetine

**Dose form**

Oral Solution

**Strength**

Semantic clinical drug component

**Ingredient**

**Ingredient**

Semantic clinical drug form

**Dose form**

**Strength**

Semantic clinical drug

**Ingredient**

**Dose form**



# Generic vs. Brand

## ■ Generic

- Ingredient (IN) ←
- Clinical drug form (SCDF) ←
- Clinical drug component (SCDC) ←
- Clinical drug (SCD) ←

## ■ Brand

- Brand name (BN)
- Branded drug form (SBDF)
- Branded drug component (SBDC)
- Branded drug (SBD)

*tradename\_of*

Fluoxetine

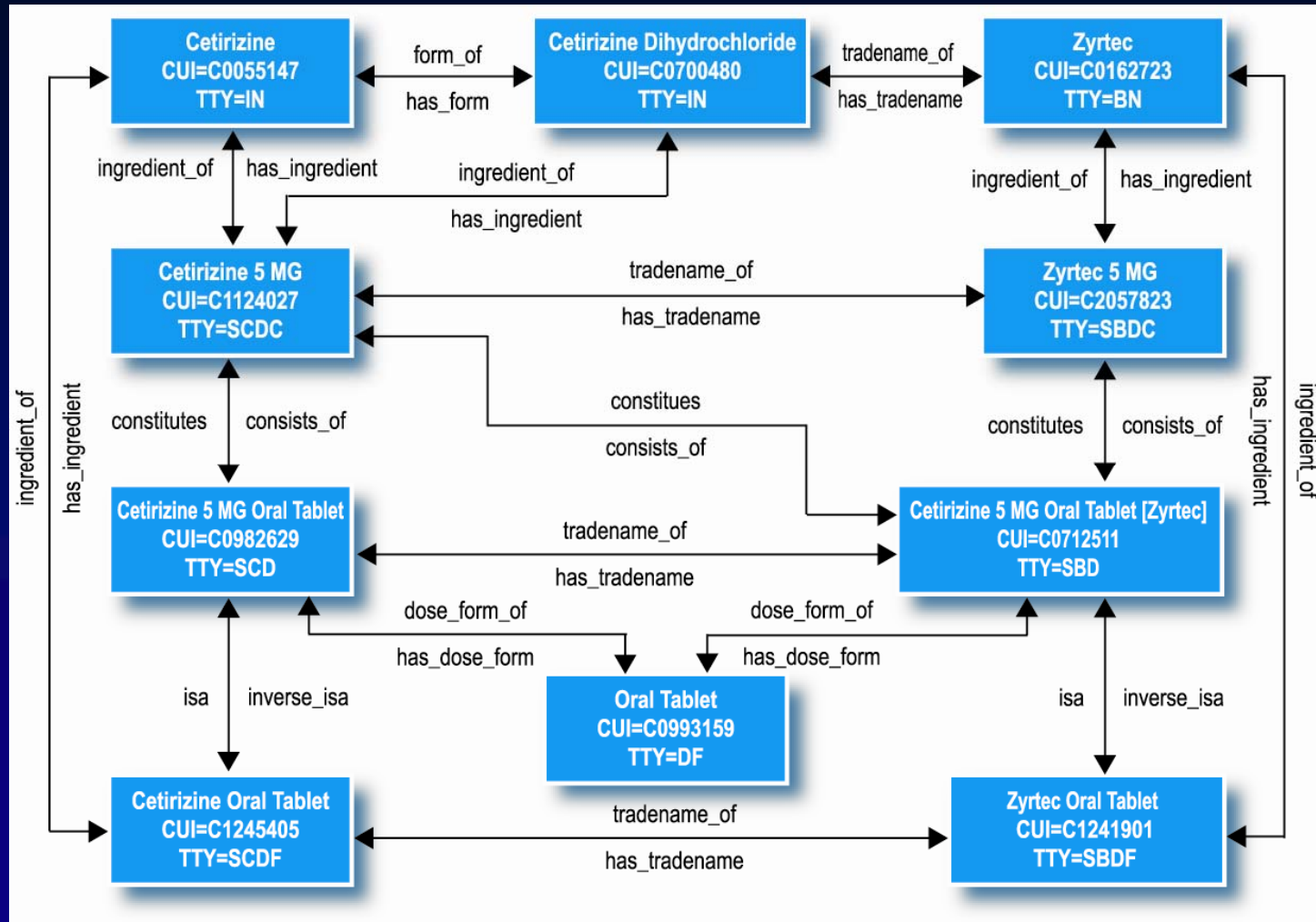
Fluoxetine 4 mg/ml oral solution

Prozac

Fluoxetine 4 mg/ml oral solution [Prozac]



# Relations among drug entities





# RxNorm database

## ■ Data sources

- Master Drug Data Base
- Multum MediSource Lex.
- Micromedex DRUGDEX
- National Drug Data File Plus Source Vocabulary
- FDA National Drug Code Directory
- VA National Drug File
- SNOMED Clinical Terms

## ■ Content

- 5,590 ingredients
- 11,148 brand names
- 13,756 clinical drug comp.
- 17,703 clinical drugs
- 13,938 branded drugs
- 13,336 branded drug comp.
- 8,308 clinical drug forms
- 10,496 branded drug forms
- 337,794 NDC code attributes

*(as of 10/12/2006, excluding obsolete terms)*



# Visualization and processing of drug information



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# RxNav

- Visualization and navigation
  - RxNorm browser
  - Spelling correction
  - Search on names and codes
  - Standalone application
    - RxNorm database at NLM
    - Local RxNorm database
- Drug information processing
  - API to the RxNorm database
  - Web services





# RxNav demo

<http://mor.nlm.nih.gov/download/rxnav/>



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# RxNav: Search features

By:

- String concept name
- GCN Generic Code Number (First Data Bank)
- GFC Generic Formula Code (Micromedex)
- GPPC Generic Product Packaging Code (Medi-Span)
- LISTING\_SEQ\_NO ID (FDA's National Drug Code Directory)
- NDC National Drug Code (FDA)
- RXCUI unique identifier in RxNorm
- SNOMED ID unique identifier in SNOMED CT
- UMLS CUI unique identifier in the UMLS
- VUID Number unique identifier in the VA National Drug File



# Future work

*Integrated drug information*



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# Integration

- Equivalent strings and codes
- Links from RxNav to applications or vocabularies
  - MeSH
  - DailyMed
  - MyMedicationList
- Single entry point for a variety of information
  - One stop shopping for drug information



# Equivalent strings and codes across sources

Ticlid

STR	SAB	Code
-----	-----	------

Ticlid	RxNorm	227257
Ticlid	MMSL	2177

*Equivalent codes*

- RXCUI:227257
- BRAND\_CODE:2177

Acetaminophen

STR	SAB	CODE
-----	-----	------

Acetaminophen	RxNorm	161
APAP	MMSL	4992
Paracetamol	SNOMEDCT	3875170004
...		

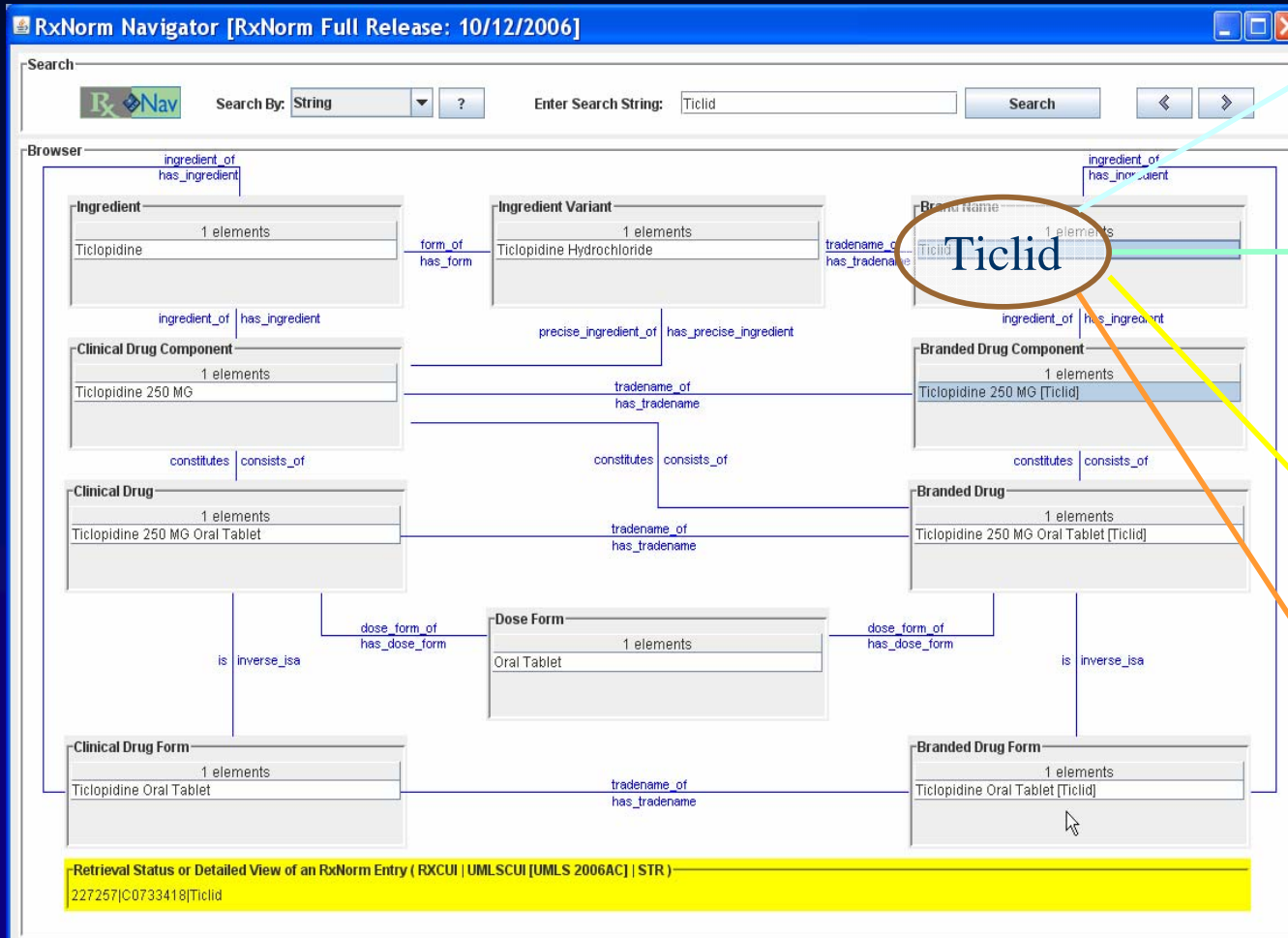
*Equivalent strings*

- Acetaminophen
- Paracetamol
- ...





# Links to applications or vocabularies



MeSH

DailyMed

Equivalent strings and codes (authenticated users)

MyMedicationList



# MeSH: Pharmacologic actions

Ticlid

National Library of Medicine - Medical Subject Headings

2006 MeSH

MeSH Descriptor Data

[Return to Entry Page](#)

MeSH Heading	Ticlopidine
Tree Number	<a href="#">D02.886.778.834</a>
Tree Number	<a href="#">D03.383.903.834</a>
Scope Note	Ticlopidine is an effective inhibitor of platelet aggregation. The drug has been found to significantly reduce infarction size in acute myocardial infarction. Ticlopidine is an effective antithrombotic agent in arterial disease, atherosclerosis, aortic aneurysms, aortic dissection, aortic fistulas, aorto-coronary bypass grafts, ischemic stroke, myocardial infarction, peripheral vascular disease, venous thrombosis, and arteriosclerosis.
Entry Term	53-32C
Entry Term	Ticlid
Entry Term	Ticlopidix
Entry Term	Ticlodone
Entry Term	Ticlopidine Hydrochloride
Allowable Qualifiers	<a href="#">AA</a> <a href="#">AD</a> <a href="#">AE</a> <a href="#">AG</a> <a href="#">AI</a> <a href="#">AN</a> <a href="#">BL</a> <a href="#">CF</a> <a href="#">CH</a> <a href="#">CJ</a> <a href="#">CT</a> <a href="#">DU</a> <a href="#">EC</a> <a href="#">HI</a> <a href="#">IM</a> <a href="#">IP</a> <a href="#">ME</a> <a href="#">PD</a> <a href="#">PK</a> <a href="#">PO</a> <a href="#">RE</a> <a href="#">SD</a> <a href="#">ST</a> <a href="#">TO</a> <a href="#">TU</a> <a href="#">UR</a>
Pharm. Action	<a href="#">Fibrinolytic Agents</a>
Pharm. Action	<a href="#">Platelet Aggregatior Inhibitors</a>
CAS Type 1 Name	Thieno (3,2-c)pyridine, 5-((2-chlorophenyl)methyl)-4,5,6,7-tetrahydro-

*Pharmacologic action*

- Fibrinolytic Agents
- Platelet Aggregation Inhibitors



# DailyMed: Drug label information

Ticlid

## Adverse reactions

- Agranulocytosis
- Thrombotic thrombocytopenic purpura
- ...

For a FDA View of this Label, click here

**DrugLabel Sections**

Description Clinical Pharmacology Indications & Usage Contraindications  
Precautions Adverse Reactions Overdosage Dosage & Administration  
Patient Counseling Information Supplemental Patient Material

Revision Date: 12/14/2005  
TICLID®  
(ticlopidine hydrochloride)  
TABLETS

**WARNING:**  
TICLID can cause life-threatening hematological adverse reactions, including neutropenia/agranulocytosis, thrombotic thrombocytopenic purpura (TTP) and aplastic anemia.

**Neutropenia/Agranulocytosis:**  
Among 2048 patients in clinical trials in stroke patients, there were 50 cases (2.4%) of neutropenia (less than 1200 neutrophils/mm<sup>3</sup>), and the neutrophil count was below 450/mm<sup>3</sup> in 17 of these patients (0.8% of the total population).

DailyMed



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# *MyMedicationList*

- Patient owned, personal, confidential
- Standard drug information
- Personal drug list management
  - Add
  - Delete
  - Update/Notification
- Interface with EHR (electronic health record)



# More information



- <http://mor.nlm.nih.gov/download/rxnav/>

- RxNorm

- <http://www.nlm.nih.gov/research/umls/rxnorm/index.html>

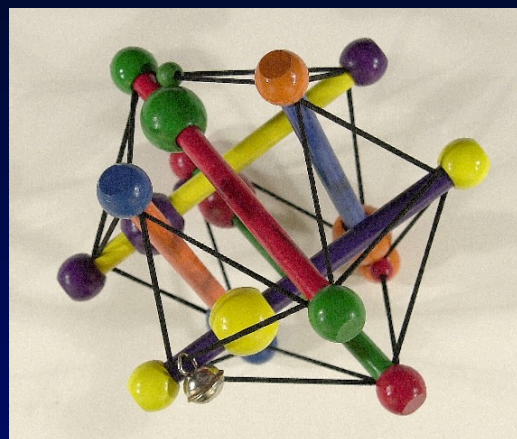
- DailyMed

- <http://dailymed.nlm.nih.gov/>





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# MeSH Section

- UMLS Editing/Production
- RxNorm
- DailyMed
- Links at [www.nlm.nih.gov/mesh](http://www.nlm.nih.gov/mesh)

