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United States National Library of Medicine Drug Information Portal

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Abstract

The Drug Information Portal is a free Web resource from the National Library of Medicine (NLM) that provides a user-friendly gateway to current information for more than 15,000 drugs. The site guides users to related resources of NLM, the National Institutes of Health (NIH), and other government agencies. Current drug-related information regarding consumer health, clinical trials, AIDS, MeSH pharmacological actions, MEDLINE/PubMed biomedical literature, and physical properties and structure is easily retrieved by searching on a drug name. A varied selection of focused topics in medicine and drugs is also available from displayed subject headings. This column provides background information about the Drug Information Portal, as well as search basics.

Keywords

clinical trials; databases; drug; drug information; Drug Information Portal; hazardous substances; Internet resources; National Library of Medicine (NLM); public health; PubMed; U.S. Food and Drug Administration (FDA)

INTRODUCTION

The United States National Library of Medicine (NLM) is part of the National Institutes of Health (NIH) within the Department of Health & Human Services (HHS). It is the world's largest medical library and is a leader in the selection, acquisition, organization, and provision of medically related literature and data. In 1966, the "...President's Science Advisory Committee report *Handling of Toxicological Information* provided the impetus for the development of the Toxicology Information Program ... at NLM..."¹ The Toxicology and Environmental Health Information Program (TEHIP) consequently became part of NLM's Division of Specialized Information Services (SIS), a unit responsible for a collection of databases and related information on environmental health and toxicology. Many of these

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resources include information on the chemical agents officially classified as drugs. Some of these resources are created in SIS; others originate from a variety of national and international agencies and associations.

BACKGROUND

Drug information within NLM can be found in numerous and diverse resources. For example, biomedical literature citations can be found in MEDLINE/PubMed® <http://www.pubmed.gov> and TOXLINE® <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?TOXLINE>, while clinical trials information is located in Clinical Trials <http://clinicaltrials.gov>. DailyMed® <http://dailymed.nlm.nih.gov>, the Hazardous Substances Databank® <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>, and LactMed <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?LACT> provide specific summary drug information. More consumer oriented resources for drug information include MedlinePlus® <http://www.nlm.nih.gov/medlineplus/druginformation.html> and AIDSinfo® <http://www.aidsinfo.nih.gov/DrugsNew/Default.aspx?MenuItem=Drugs>. Technical drug structure information can be found in ChemIDplus® <http://chem.sis.nlm.nih.gov/chemidplus/chemidheavy.jsp>, PubChem <http://pubchem.ncbi.nlm.nih.gov>, and in the NLM MeSH <http://www.ncbi.nlm.nih.gov/sites/entrez?db=mesh>.

Other government resources offering drug-related information include Drugs@FDA <http://www.accessdata.fda.gov/Scripts/cder/DrugsatFDA/> and the Drug Enforcement Administration <http://www.usdoj.gov/dea/index.htm>. In fact, “a huge number of drug reference sources exist,”² and navigating this varied territory can be a challenge even for experienced information professionals.

The goal of the NLM Drug Informal Portal is to provide users with a single entry point for accessing this data. The Portal provides current information on more than 15,000 selected drugs, or more than 194,000 unique drug names and their synonyms, from their entry into clinical trials to their admission to the marketplace. The scope of coverage includes the NLM resources noted above, drugs with official generic name status such as USAN (United States Adopted Name)³ or INN (International Nonproprietary Name),⁴ and drugs that have categories extracted from the NLM MeSH Pharmacological Action data.⁵ Drugs originating in other countries are covered but not as thoroughly as U.S. drugs; not all experimental drugs are included. Dietary supplements are included only if they are covered by the sources above.

SEARCHING

The Drug Information Portal home page <http://druginfo.nlm.nih.gov> (see Figure 1) is uncluttered, with a simple search box inviting users to enter a trade or generic drug name. (The trade name and the generic name will retrieve the same record.) JavaScript must be enabled in the browser due to the interactive features of the site.

Portions of names can also be searched by using an asterisk at the beginning and/or end of a search term. For example, “ibuprofen*” locates drugs that begin with the term “ibuprofen.” An asterisk can be used at either or both ends of a term to find text embedded in a drug name: “*cillin*” will retrieve drugs that contain this ending as part of their name.

In addition, truncation can be employed to search general drug classes by using the generic name stem of a drug. A table of these stems is provided <http://druginfo.nlm.nih.gov/drugportal/jsp/drugportal/DrugNameGenericStems.jsp>. Stems

may be searched by using asterisks for truncation (see Figure 2); for example, “*azepam*” can be entered to find drug names that correspond to anti-anxiety drugs such as Lorazepam.

Checking the “By Category” radio button above the search box enables users to search the Portal by the general category of usage of a drug. These drug categories are derived from the MeSH Pharmacological Action field. A list and description of these are provided via a link below the search box labeled “Show drug category descriptions”
<<http://druginfo.nlm.nih.gov/drugportal/jsp/drugportal/categories.jsp>>

Both drug name and drug category searches provide suggestions below the search box as characters are entered (see Figure 3). These suggestions are offered after entry of the first three characters of a name search and after the first two characters of a category search. Because MeSH notes are included in the spell checker, the suggestions give the user additional information about each potential name choice. If a matching name is not found, the system explains that “Your search did not retrieve any exact matches. It may be spelled wrong, or is not in our database. Are the similar names below of interest?”

Brief explanations of these search options can be found by selecting the “Show examples” link directly below the Drug Information Portal’s home page search box, and in the site’s FAQs
<<http://druginfo.nlm.nih.gov/drugportal/jsp/drugportal/faq.jsp>>.

SEARCH RESULTS

When a match is found, a drug name, as well as a description of the drug’s actions, uses, and synonyms, are provided. The drug name is usually the official generic name for the drug. If available, the source of the generic name follows in brackets. The description is typically taken from the “Note” field of the NLM MeSH file. (MedlinePlus and DailyMed also provide summaries of the use of a drug if they have data for the particular drug searched.) A list of the categories to which the drug belongs is also provided; category definitions can be viewed by selecting the information button. Selecting any of the categories retrieves drugs with the same or similar uses. Searches retrieving multiple results are sorted by the number of citations in PubMed, from highest to lowest; this tends to display the most frequently discussed drugs first. Search results also offer links to related information under the headings of “Summary,” “Detailed Summary,” and “Additional Resources” (see Figure 4). Clicking on the hyperlinks opens a new window with the findings from that resource. A help tool describing the general scope of the resource, as well as an information button giving more complete descriptions, is offered for each hyperlink.

The resources included under the Portal’s search results “Summary” section provide easy-to-understand information about the drug searched. For example, MedlinePlus presents a consumer level summary of uses, side effects, and precautions. MedlinePlus Topics shows results from all resources found in MedlinePlus including health topics, drug and supplement data, and medical encyclopedia references. LactMed offers data related to the effect of the drug on lactating mothers and their children and includes descriptions of potential problems as suggested precautions. NLM’s DailyMed shows the latest official drug label from the Food and Drug Administration (FDA; the equivalent of the latest package insert). ClinicalTrials.gov provides information about clinical research studies, including where they take place and how candidates are selected. Results of clinical trials are also included.

“Detailed Summary” Resources

Search results listed under “Detailed Summary” supply more comprehensive and technical information. Those under the HSDB heading cover the drug’s therapeutic uses, warnings, and interactions with other drugs. The MEDLINE/PubMed and TOXLINE results offer citations

to papers in the medical literature and include the title, author(s), and publisher location; many citations have an abstract, related citations, and links to the original paper. The PubChem results show chemical structure information, as well as links to related chemicals and to biological data such as metabolic pathways. The NIH National Institutes of Allergy and Infectious Diseases (NIAID) ChemDB provides a summary of the test data for the drug against HIV, HIV enzymes, or opportunistic pathogens, and includes chemical structure data and tables of anti-HIV data and literature references. ChemIDplus supplies chemical structure, nomenclature, physical/toxicological information, and links to international sites with additional information.

“Additional Resources”

The “Additional Resources” section of the Portal’s search results includes data available from Drugs@FDA and from USA.gov. The FDA site offers dosage forms, as well as links to the official drug label and to drug warnings. USA.gov retrieves a list of federal and state Web sites that discuss the drug in order of their relevance; results are indexed by topic and by agency.

DRUG RESOURCES BY AUDIENCE AND CLASS

Because understandable drug information can be difficult even for specialists to locate, the NLM Drug Information Portal provides lists of resources selected for specific user groups, accessed via the “Resources by Audience/Class” tab. “Drug Information for the Public” <<http://druginfo.nlm.nih.gov/drugportal/jsp/drugportal/consumerDrugs.jsp>> presents resources related to the drug’s “Background” and to “Using Medicines Safely.” Information related to “Drug Types,” “Clinical Trials,” “Medicare Prescription Plans,” “Buying Medicines Online,” and “Información en Español” is also provided.

The “Drug Information for Health Professionals” page, <<http://druginfo.nlm.nih.gov/drugportal/jsp/drugportal/professionals.jsp>>, includes information on “Medicare Prescription Plan,” “Buying Medicines Online,” “Specialized PubMed Searches,” “Prescription Drug Abuse,” “Prescription Drug Advertising,” and “Prescription Drug Labeling.” “Drug Information for Researchers” lists links pertaining to “Intellectual Property Drug Data” and to “NIH Research Initiatives and Funding.” “Drug Information for Librarians” connects those professionals with resources related to “Training and Search Guides” and to “Document Delivery.” For users interested in information based on classification, the “Resources by Audience/Class” (see Figure 5) page also provides links to drugs in the prescription, over-the-counter, dietary supplements, drugs of abuse, and investigational categories.

For investigating dependable drug-related resources for more detailed information, links on the “NLM Research Resources” tab offer guidance to NLM tools such as RxNorm (standardized nomenclature for clinical drugs) and the Entrez/Pubmed cross-database search (a retrieval system designed for searching linked databases, including PubMed, the literature component of Entrez). This page also provides information about key resources pertaining to “small molecules” (most medicines marketed today have molecular weights of 500 or below)⁶ and to “pharmacogenomics” (the study of how genetics affects the body’s response to drugs). Links are also provided to PubChem (information on the biological activities of small molecules); MEDLINE/PubMed; the NIH Roadmap (translation of knowledge into effective prevention strategies and new treatments); the NIH National Cancer Institute’s (NCI) Research Resources (listing of scientific tools, reagents and services developed by the NCI to support cancer research), and the NIAID Therapeutics Database. Information regarding questions such as “What is Pharmacogenomics?” and topics such as how the field of pharmacogenomics is being used is also provided.

ADDITIONAL FEATURES

The Drug Information Portal also offers current drug-related news from NLM's MedlinePlus and the FDA under the "News and Features" tab. Help with searching and navigating the site is provided via a FAQ <<http://druginfo.nlm.nih.gov/drugportal/jsp/drugportal/faq.jsp>>. The "Inside the Medicine Cabinet" segment highlights drug-related subjects of interest via short articles on such topics as the NIH's collaborative drug discovery process and development contributions by means of preclinical interaction between researchers and NIH partners.

CONCLUSION

Access to timely and trustworthy drug information can be vital. The NLM Drug Information Portal gathers together a wide range of resources in one site, making it easier for users to quickly find the information they need about a drug. It provides a straightforward way to research nearly 200,000 unique drug names and their synonyms for current information related to consumer health, clinical trials, biomedical literature, and physical properties and structure within major U.S. government resources.

FOR MORE INFORMATION

More information about the NLM Drug Information Portal and other NLM drug related resources can be found at the Division of Specialized Information Services home page <<http://sis.nlm.nih.gov/>>. Updates on these resources can be obtained from the NLM-Tox-Enviro-Health-L e-mail announcement list <<http://sis.nlm.nih.gov/enviro/envirolistserv.html>>. The SIS RSS (Really Simple Syndication) feed <<http://sis.nlm.nih.gov/rss/sisnewsfeed.rss>> provides information about new resources, updates to NLM toxicology, environmental health, and disaster/emergency databases, and posts alerts to scientific meetings at which NLM will have exhibits, presentations, or classes. Questions about these resources can be sent to tehip@tehl.nlm.nih.gov.

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FIGURE 1.
Home page of the NLM drug information portal.

Drug Information Portal
Quick Access to over 12,000 Selected Drugs

United States
National Library of Medicine
National Institutes of Health

Home News and Features NLM Resources NLM Research Resources Resources by Audience / Class Other Resources

Home > Search Results

Search By Name By Category

AZEPAM

Search Results: Drug Name Order Based on PubMed Citation Count

Drug Name Search: ⓘ

1. Diazepam [USAN:INN:BAN:JAN]
2. Diazepam hydrochloride
3. Flunitrazepam [USAN:INN:BAN:JAN]
4. Clonazepam [USAN:INN:BAN:JAN]
5. Lorazepam [USAN:INN:BAN:JAN]
6. Oxazepam [USAN:INN:BAN:JAN]
7. Nitrazepam [USAN:INN:BAN:JAN]
8. Flurazepam [INN:BAN:JAN]
9. Flurazepam hydrochloride [USAN:JAN]
10. Menitrazepam [INN:DCF]

Results: 1 - 10 of 70 Go to item:

Site Map, Contact Us, Copyright, Privacy, Accessibility
U.S. National Library of Medicine, 8600 Rockville Pike, Bethesda, MD 20894
National Institutes of Health, Health & Human Services
Freedom of Information Act
Last updated: Jan 2009

USA.gov

FIGURE 2.

Suggested names and descriptions offered for incomplete search match.

Drug Information Portal
Quick Access to over 12,000 Selected Drugs

United States
National Library of Medicine
National Institutes of Health

Home News and Features NLM Resources NLM Research Resources Resources by Audience / Class Other Resources

Search
DRUG INFORMATION PORTAL

☒ By Name ☐ By Category *NEW!*

aze

Go

- Azedipamin
- Azelaic acid
- Azelaic acid [USAN:INN]
- Azelaic acid, technical grade
- Azelastina
- Azelastina [INN-Spanish]
- Azelastine
- Azelastine HCl
- Azelastine hydrochloride
- Azelastine hydrochloride [USAN:JAN]
- Azelastine [INN:BAN]
- Azelastinum
- Azelastinum [INN-Latin]

FIGURE 3.
Drug portal generic name stem showing activity.

Home
News and Features
NLM Resources
NLM Research Resources
Resources by Audience / Class
Other Resources

Home > Search Results

☐ By Name
☐ By Category

Go back to previous page.

Search Results

Drug Name: Ibuprofen [USAN:INN:BAN:JAN] [\[show more names\]](#)
Search Term: ADVIL
Description: A nonsteroidal anti-inflammatory agent with analgesic properties used in the therapy of rheumatism and arthritis.
Categories: ☐ Analgesics [\[show more categories\]](#)

Summary

- ☐ Summary of drug information (MedlinePlusDrug)
- ☐ Summary of consumer health information (MedlinePlusTopics)
- ☐ Summary of the effect on breastfeeding (LactMed)
- ☐ Manufacturers drug label (DailyMed)
- ☐ Clinical trials (ClinicalTrials.gov)

Detailed Summary

- ☐ Summary of reviewed biological and physical data (HSDB)
- ☐ References from scientific journals (Medline/PubMed)
- ☐ References from toxicological journals (TOXLINE)
- ☐ Biological activities and chemical structures (PubChem)
- ☐ Biological activities against HIV/AIDS and other viruses (NIAID ChemDB)
- ☐ Toxicological and chemical resources (ChemIDplus)

Additional Resources

- ☐ Information from the US Food & Drug Administration (Drugs@FDA)

FIGURE 4.
Drug information portal search results: “Advil” “Summary” Resources.

Drug Information Portal
Quick Access to over 12,000 Selected Drugs

NLM United States National Library of Medicine
National Institutes of Health

Home News and Features NLM Resources NLM Research Resources **Resources by Audience / Class** Other Resources

Home ▶ Resources By Audience/Class

Resources by Audience / Class

- ▶ By Audience
  - ▶ The Public
  - ▶ Health Professionals
  - ▶ Researchers
  - ▶ Librarians
  - ▶ Student/Educators
  - ▶ Population Groups
- ▶ By Class
  - ▶ Prescription
  - ▶ Over-the-counter
  - ▶ Dietary Supplements
  - ▶ Drugs of Abuse
  - ▶ Investigational

Search
DRUG INFORMATION PORTAL

☒ By Name ☐ By Category

Go

FIGURE 5.
Resources by audience/class.