PubMed Tutorial

What is PubMed?

♦ Internet database developed by the National Center for Biotechnology Information (NCBI) at the National Library of Medicine (NLM). Includes links to full text articles and other related resources.
♦ PubMed consists primarily of Medline (the NLM’s searchable database of biomedical citations indexed with NLM’s controlled vocabulary MeSH). PubMed also contains additional citations detailed below.

Advantages

♦ Available to anyone with internet access at:

  http://www.isu.edu/library/articles/ihsl (click on the PubMed link)

♦ Participating journal publishers supply NLM with their citations prior to or at the time of publication, so many citations appear with essentially no lag time between publication of the article and citation on the database.

PubMed Database Coverage:

♦ Medline (5,200 biomedical journals, >15 million citations dating back to 1950)
♦ PreMedline (the in-process database for Medline, no medical subject headings yet)
♦ Publisher-Supplied Citations

  Covers:
  ♦ Medicine
  ♦ Nursing
  ♦ Dentistry
  ♦ Veterinary Medicine
  ♦ The Health Care System
  ♦ Preclinical Sciences

How to Use the Tutorial:

♦ You can do this two ways. You can either pull this up via the Internet and toggle between the tutorial and PubMed screens using the buttons at the bottom of your menu bar. Alternatively, you can print this tutorial out and use it as a guide while you’re using PubMed. Either way, read the information presented in this tutorial, then practice it in real time using PubMed. Remember that things change from moment to moment, so the numbers of articles retrieved may not match exactly, but it should be pretty close. There are exercises at the end for you to practice. Try these on your own before reading the answer key that follows.
Tutorial

⇒ **Log into any computer**, open a browser and go to:

http://www.isu.edu/library/ihsl/

⇒ **Bookmark** this site! Then click on the “PubMed” link. You may be asked for your ISU (NOT PHARMACY!) Bengal Card/Last Name combination to verify that you are associated with ISU.

Let’s look at the Home Screen features:

![Home Screen Features](image)

⇒ **Start by clicking on the “Limits” button.**

Your screen will look like:

![Limits Screen](image)
The “Limits” feature allows you to limit your search to either human or animal studies, a specific age group or gender. This feature also allows you to restrict your search to articles published in a specific language, and to specific types of articles, such as clinical trials, guidelines, or review articles. You can also limit by publication date, a specific author, or journal.

Checking the “abstracts” box will cause your search to return only those articles that have a brief overview (abstract) in the database. You probably will never use this feature since you might overlook some valuable information that doesn’t have an abstract.

Ignore the “subsets” field – you’ll probably never need to use this.

Chances are you will ALWAYS want to search for articles in English on human subjects (unless you speak Czech or particularly want studies on Bolivian chinchillas), so:

⇒ Always start by choosing “English” from the Language field and “Humans” from the Humans or Animals field. Do this now.

⇒ Now click on “Advanced Search.” Your screen will look like:

Notice that there is now a yellow menu bar with “Limits Activated”, indicating that you have chosen specific limitations to your search (human studies in English). Once you have set your limits, the yellow bar will be visible even on the home-screen.

The Preview feature in the Advanced Search feature allows you to:

• Preview the number of search results before displaying the citations
• Refine search strategies by adding one or more terms one at a time
• Add terms to a strategy from specific search fields
• View and select terms from the Index to develop search strategies
• View your search strategy as you continue to refine your search

To preview the number of results before displaying the citations, type your term(s) into the query box and click “Preview.” This displays the number of citations in your search results.

Now let’s go to the main search screen (home screen for PubMed) to initiate a search.

Let’s say you wanted to find articles on the use of vitamin C for osteoarthritis.

⇒ Type “vitamin C” (without the quotes) into the query box and hit the Go button.

Your screen should look like this:

Note that there are over fifteen thousand articles about vitamin C in the medical literature. Those with no abstract available will state “No abstract available”. If you want to change the way your search results are listed – use the “Display Settings” link located above Limits Activated bar. This will allow you select whether you want to see the abstract, the number of citations per page,
and what order you want the search information to list, i.e. by author, journal, publication date, title, etc.

Now back to our search:

Of the 15,000+ articles about vitamin C, 3,000+ are available in free full text to anyone who wants to access them. If you are affiliated with ISU, 8,300 are available free full text (note that these will be listed under the “Filter your results” section on the search screen in the upper right corner).

The program has pulled all 15,000+ citations up for you to see (the most recent ones are first), in batches of 20 at a time – so it would take a few years for you to scroll through them to find the ones about osteoarthritis.
To refine your search, let’s go back to the Advanced Search screen and utilize the Preview feature.

⇒ **Push “Advanced Search”**

Under the Search History you should see #1 Search vitamin C Limits: Human, English Select #1 and from the drop down menu select AND – you then should be able to see #1 in your Search Box.

To add another term to the existing term(s) by typing the term into the “Search Builder” box. Follow these instructions to build your search:

1. Choose a field to search.
2. Enter search term(s).
3. Click the Show Index link to display a list of terms, if desired.
4. Change the default AND operator, if necessary.
5. Click the Add to Search Box button.
6. Repeat steps as necessary.
7. Click Search to run your query, or click Preview to see the result count of your query in the Search History section.

⇒ **Type “osteoarthritis” into this box, select the “AND” operator.** Then click Add to “Search Box” button. Note that this brings the term up into the original query field. Now hit the Preview button.

Your screen should look like this:
By “ANDing” osteoarthritis to vitamin C, you have decreased the total number of articles from several thousand to 40 or so.

⇒ Click on the underlined number of retrieved articles on the far right of your screen in order to view them. Your screen will now look like:

There are a few things to notice here. Each citation will give you the authors’ names, the title of the article, the journal name, year and month published, volume number, issue number, and page numbers. This is followed by the type of article (review, clinical trial, letter, case report, etc.). The PMID stands for “PubMed Identification.”

An example from this search:

Title
Authors
Journal name, year, volume, issue #, pages
PubMed Identification Number
Let’s say you wanted to read the abstract that goes along with this article in order to decide if it would be useful to you or not.

⇒ **Click on the underlined article title’s name.** You will see:

**Remember that you may have to push “PDF” in order to get a nice clean copy of an article, and you must have Adobe Reader downloaded on your computer in order to view and print the PDF.**

So let’s see exactly what our search criteria were.

⇒ **Look at the “Search details” on the right hand side of the screen. (For this example type “vitamin C and osteoarthritis” in your search box before looking at the search details).**
Note that PubMed searched for “ascorbic acid” even though you only asked it to search for “vitamin C”. This is called automatic term mapping, and is a feature unique to PubMed.

Let’s say you liked this article and wanted to mark it and print it out. You could simply print out the entire abstract page (in this case you would have a sheet of paper for every article you want) OR you could hit the “back” button and return to the list of citations. After you hit the “back” button, select (“check”) the article you wanted then:

⇒ Click the “Send to:” link on the upper right, just above the limits bar. Now select “Clipboard” on the far right and click on the “Send To” button.

Your screen will look like:
The Clipboard is a temporary spot to hold your citations until you’ve scanned through your entire search to be sure you know which ones you want to print out. Citations are held on this screen for eight hours – they are lost after this!

To view what you have placed on your “Clipboard” Press the “Clipboard” button on the right hand side of the page. This will also show you how many items are on your “Clipboard”; in addition there will be green lettering underneath the article reference that states “Item in clipboard”.

Your screen will look like:

If you click “Add To Clipboard” without selecting citations using the check box, PubMed will add all of your search results to the Clipboard (up to 500 citations!)
To return to your search, just hit the “Advanced Search” link above the Search Box.

⇒ Let’s modify the search a bit. Perhaps we learned from some background reading that vitamins A, D, and E may be involved in arthritis. Let’s broaden our search to include these. Now we want to know if vitamin A or vitamin C or vitamin D or vitamin E have any role in the treatment/pathogenesis of osteoarthritis. We want our search to be:

\[
\text{vitamin c OR vitamin a OR vitamin d OR vitamin e} \\
\text{AND} \\
\text{osteoarthritis}
\]

Since we already have “vitamin c” in the main query field,

⇒ You will be following the same instructions as above when you were adding osteoarthritis to your vitamin c search. So select #4 from your history and add it to the Search Box. In the Search Builder type “vitamin a” and select the “OR” operator and then press the “Add to Search Box” button.

Now your screen should look like:

⇒ Repeat this process with “vitamin d” and “vitamin e”, hitting the “OR” key at the bottom after each term is entered. Now your screen should look like:
In order to “AND” these vitamins with osteoarthritis, type “osteoarthritis” into the “Search Builder” box and select the “AND” operator and then press the “Add to Search Box.” Now press the “Preview” button to see what our search yielded. It should look like:

![PubMed Advanced Search](image)

Note that the search broadened because you used the "OR" command. Your search now includes "vitamin a AND osteoarthritis" OR "vitamin c AND osteoarthritis" OR "vitamin d AND osteoarthritis" OR "vitamin e AND osteoarthritis."

Let’s say we don’t want to scroll through all these articles. We want just a good solid review article to give us an overview of the topic.

Type in “review” in the “Search Builder” box. Use the pull-down menu that says “All Fields” to specify “Publication Type.”

This will limit your search to those articles about vitamins A, C, D, or E and osteoarthritis that are review articles.
Once you press “Add to Search Box” and “Preview” your screen should look like:

![PubMed Advanced Search](image)

Note that you can use this pull-down menu to restrict your search to author name, journal name, language, publication date, major topic, title word, etc.

If you want to see your entire search history, look below the “Search Builder” box in the section “Search History”. This area is useful if you have become completely muddled and want to start over with a fresh screen. If that’s the case, just click on “Clear History” button and you can start all over.

Let’s practice marking and printing articles from a search.

⇒ Mark two or three of these articles in your search by clicking in the little box just to the left of the citation, click “Send to:” then select “Clipboard,” view them in your clipboard, and print them out.

**PubMed Shortcuts**

- If you know exactly what you want up front, just start with the Limits page and identify the publication type, age range of study population, date of publication, language, human vs. animal, and gender, if applicable.

If you are looking for the standard-of-care for any disease state, use the limit field to specify “Practice Guideline” as a publication type. This will take you directly to the guidelines for treating the disease state you’re interested in.
You can use the Boolean operators “AND” “OR” and “NOT” in the main query field without being in the “Advanced Search” screen.

**Search Rules and Syntax**

1. Boolean operators, AND, OR, NOT should be entered in upper case.
   
   Example: vitamin c OR zinc

2. PubMed processes all Boolean connectors in a left-to-right sequence. You can change the order in which PubMed processes a search statement by enclosing an individual concept in parentheses. The terms inside the set of parentheses will be processed as a unit and then incorporated into the overall strategy.
   
   Example: common cold AND (vitamin c OR zinc)
   
   Example: (heat OR humidity) AND multiple sclerosis

When you’re in the “Advanced Search” screens, you can combine searches using only the search numbers. For example, if your Search History looks like:

You can search for articles about drug therapy of osteoporosis by typing the following into the query field:

   #1 AND #2

If you wanted to know about the use of calcium for the prevention of osteoporosis, type the following into the query field:

   #1 AND #3 AND #4

If you wanted to identify studies comparing bisphosphonates (like alendronate or etidronate or pamidronate) to calcium supplementation in the treatment of osteoporosis, you would type in:

   #1 AND #2 AND #3 AND #5
If you wanted studies about calcium or bisphosphates in the treatment of osteoporosis, you would type in:

#1 AND #2 AND (#3 OR #5)

- If you’re not sure of the exact spelling or form of a word (for example, you don’t know whether to search for “necrosis” or “necrotizing”, you can use the wildcard symbol “*” by typing necro* into the query field. This is called truncation.

**In addition, PubMed now has an “intelligent” automatic text recommendation. When you start typing a search term PubMed will automatically select words that fit and offer those selections in a drop down box.**

When you look at the Details of a search, many of the words are identified as “MeSH Terms.”

MeSH terms are the National Library of Medicine’s Medical Subject Headings – a controlled vocabulary of biomedical terms which is used to describe the subject of each journal article in MEDLINE. MeSH contains more than 19,000 terms and is updated annually to reflect changes in medicine and medical terminology. MeSH terms are arranged hierarchically by subject categories with more specific terms arranged beneath broader terms.

Here is a list of MeSH terms that you will find very useful when searching the drug literature:

<table>
<thead>
<tr>
<th>drug therapy</th>
<th>administration and dosage</th>
<th>guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>combination drug therapy</td>
<td>oral</td>
<td>practice guidelines</td>
</tr>
<tr>
<td>adverse effects</td>
<td>transcutaneous</td>
<td></td>
</tr>
<tr>
<td>poisoning</td>
<td>topical</td>
<td></td>
</tr>
<tr>
<td>toxicity</td>
<td>buccal</td>
<td></td>
</tr>
<tr>
<td>prevention and control</td>
<td>rectal</td>
<td></td>
</tr>
<tr>
<td>contraindications</td>
<td>vaginal</td>
<td></td>
</tr>
<tr>
<td>substance withdrawal</td>
<td>parenteral infusion</td>
<td></td>
</tr>
<tr>
<td>substance abuse</td>
<td>sublingual</td>
<td></td>
</tr>
<tr>
<td>cross reactions</td>
<td>intranasal</td>
<td></td>
</tr>
<tr>
<td>withdrawal symptom</td>
<td>subcutaneous</td>
<td></td>
</tr>
<tr>
<td>drug allergy</td>
<td>intravenous</td>
<td></td>
</tr>
<tr>
<td>drug interactions</td>
<td>intramuscular</td>
<td></td>
</tr>
</tbody>
</table>
In the olden days (a few years ago), if you didn’t use the exact MeSH term for something, your search results would be pathetic. For example, if you were looking for articles on bedsores, you would pull up maybe 5 articles. That’s because you didn’t use the appropriate MeSH heading of “decubitus ulcers.”

The new PubMed has an amazing feature called **Automatic Term Mapping**. This feature allows you to type in any search term. The term is automatically matched against a MeSH translation table, a journals translation table, a phrase list, and an author index.

Try this:

⇒ Type in the topic of “canker sores” into the query field and push the “Search” button. Now look over on the right-hand side of the page under the “Search Details” section - press the “See more…” link at the bottom right of that section.

This is what your screen should look like:

PubMed automatically searched the appropriate MeSH heading of “aphthous stomatitis” and also searched for “canker sores” as a text word in the abstract.

⇒ Try this again by typing in the topic of heart attack into the Search field in the “Advanced Search” screen and push the “Preview” button. Click on the results to see the citations. Now press the “See more…” link in the Search Details section. PubMed automatically searched for “myocardial infarction” as a MeSH term. Cool, isn’t it?

Automatic Term Mapping works extremely well for disease states. It does NOT work at all when you are searching for drug classes. For example, typing in “SSRI” instead of “serotonin uptake inhibitors” will severely limit your search. Always remember to double check your drug class search term with the “MeSH browser on the left sidebar of PubMed.
How To Get Articles Once You’ve Identified Them

The best way to identify articles on PubMed is to enter PubMed through the Oboler Library’s Idaho Health Science Library website:

Go to: http://www.isu.edu/library/ihsl/ and select “PubMed.”

⇒ The benefit of getting into PubMed this way is that it will automatically tell you if the article you want is available in ISU’s library or can be accessed online for free.

**NOTE: if you are accessing articles from the library off campus you will be asked for your Bengal Card number and your last name.**

So now you have a citation – if Oboler Library has it in hard copy format only, then trot on down there and copy it. If the article is available online in PDF format, just push “print” and voila! You have your article without actually having to move more than your fingers.

What if ISU does not subscribe to the publication you want an article from???

First, try: www.freemedicaljournals.com OR the A-Z Journals List available from www.isu.edu/library/ihsl

If no luck there, then we need to delve into the dreaded “Interlibrary Loan” territory – also known as “Loansome Doc.”

Here’s what to do:

Bring up the citation on PubMed and click “Send To” then “Order”

This will lead you to a screen where you can either enter your email address and password if you already have one, or you can register. If you need to register, just follow the instructions on the screen. Click “Sign Up!” then “skip this step” then enter “iduisl” for the library ID then hit “Continue.” When it asks you for an authorization code, there will be a phone number there for interlibrary loan. You must call during normal business hours to get the secret code. Insert this, fill in your Bengal Card ID number and the identification fields.

For “Delivery Method” select email (either web or PDF will work). Selecting the fax option will cost you lots of $$$. Be sure to include your preferred e-mail address. Articles will be sent via e-mail link whenever possible.

At the bottom of the screen click “Yes” for “Authorize” and you’re done.

**REMEMBER YOU’LL BE CHARGED $1 FOR EACH ARTICLE YOU ORDER. DO NOT ORDER THINGS THAT ARE ALREADY IN THE LIBRARY OR YOU MAY GET DINGED A FURTHER FEE AND/OR RECEIVE A NASTY-GRAM FROM INTERLIBRARY LOAN.**

You can order articles one at a time, or select several articles and order them all at once. Be sure to allow plenty of time for articles to arrive. It can take up to two weeks (sometimes longer) to get an article.
PubMed Practice
(note this is an optional exercise, but will be very beneficial to you on the oral and written exams – try these exercises, then check yourself with the key that follows)

Exercise #1

Clear your history and start with a fresh main screen and no limits set.

From the Advanced Search screen, search for articles on nonsteroidal anti-inflammatory drugs (NSAIDs). How many articles did you identify? _______

Click on the results to look at the first page of these citations. View the “Search Details” button to see how your search was done in PubMed.

You want to know if there are any articles on NSAIDs being applied topically. (Hint: get back to the Advanced Search screen – enter “topical” and OR it with “transcutaneous” first in order to get the greatest number of hits and then AND it with NSAID). Now you have _______ hits. Wowie!

You want to know if NSAIDs applied topically can lead to kidney failure. How many articles do you come up with now? _______ (Hint: take the most recent search and AND it with kidney failure). (Another hint: you could also AND this with “chemically induced” to select those articles about drug-induced kidney failure).

Select and move all of these articles over to your clipboard and print them out if you want practice doing this.

Exercise #2

Clear your history and start with a fresh main screen and no limits set.

From the Advanced Search screen, search for articles on rheumatoid arthritis. How many articles did you identify? _______

Scroll through the first page or so of results. Notice that you’ve picked up some foreign articles (those have titles that are bracketed).

Now restrict the search to English language only. How many articles did you identify? _______

How many articles in English have to do with the drug therapy of rheumatoid arthritis? _______

You recall that the physician you’re doing this research for only wanted articles published in the last 5 years. How many articles fall in this category? _______

We’re cookin’ now! You remember that she wanted only articles that had to do with methotrexate or etanercept. The number of articles that meet those criteria is _______. (Hint: it’s easiest to do this from the Search History on the Advanced Search screen). Do you want to scroll through all those citations? Me neither.

Limit the search to review articles. This leaves us with _______ citations.
DOH! You just remembered that the doc is a pediatrician, and only wants information on children younger than 18 y/o. Now we have __________ articles.

Okey dokey! Now we have a number we can deal with. Choose 5 of these articles to pull by clicking the little box just to the left of the citation, and move them over to your clipboard.

**Exercise #3**

Clear your history and start with a fresh main screen and no limits set.

From the Advanced Search screen, search for articles on interactions between H2 blockers and antifungal agents. How many articles did you identify? __________

Click on the results to look at the first page of these citations. View the “Search Details” section to the right to see how your search was done in PubMed.

You notice a lot of extraneous animal data in this search. Limit it to human studies only. This leaves ________ articles.

A friend mentions there is a great review article in a journal entitled “Annals of Pharmacotherapy.” Can you screen your search results to show just those articles published in this journal?

There are ________ of them. Select and move all of these articles over to your clipboard.

**Exercise #4**

Clear your history and start with a fresh main screen and no limits set.

From the Advanced Search screen, search for articles on the usefulness of SSRIs in PMS. (Hint: typing in “SSRI” won’t get you very far. Click on the “MeSH Database” button on the bottom left side on the Advanced Search screen. Type in “SSRI” and you’ll find that this doesn’t automatically term map to anything relevant. Type in “serotonin inhibitor” and you’ll find the appropriate MeSH heading as “serotonin uptake inhibitors,” so use this term in your search field (you’ll have to back out of the MeSH browser first).

How many articles did you identify? __________

Your instructor mentions that a good article was published in 2008 in the Journal of Clinical Psychopharmacology. Can you find it and figure out how to access it? Can you print it off in PDF format or do you have to haul your tired behind to the library?

**Exercise #5**

Clear your history and start with a fresh main screen and no limits set.

Search for practice guidelines published in the last 10 years for the treatment of hypertension in English. You should find ________ citations.

Use your limits to narrow this down, identifying hypertension as a MeSH major topic. Now you have ________ citations.
You know that the current US guidelines are published by the Joint National Committee. Can you find this one? (Hint: you may have to search for “joint national committee” in the title field in order to narrow this one down)

**Exercise #6**

Clear your history and start with a fresh main screen and no limits set.

From the Advanced Search screen, search for review articles in English on the use of combination drug therapy for the treatment of epilepsy in children less than 18 that were published in the last two years.

You should find ________ articles.

**Exercise #7**

Clear your history and start with a fresh main screen and no limits set.

Look for practice guidelines for the immunization of people with diabetes for influenza and pneumococcal diseases.

**Exercise #8**

Clear your history and start with a fresh main screen and no limits set.

Can antihypertensives give you diabetes? There was an important study on this topic in the New England Journal of Medicine – can you find it?

**Exercise #9**

Clear your history and start with a fresh main screen and no limits set.

Find articles about the use of hyperbaric oxygen for the treatment of diabetic foot ulcers. You heard there’s a good one by Cathy Heyneman. Can you find it?