PubMed User Guide

Last update: June 1, 2020

Follow PubMed New and Noteworthy for brief announcements highlighting recent enhancements and changes to PubMed.

FAQs

- How can I get the full-text article? What if the link to the full-text is not working?
- How do I search by author?
- How do I search by journal name?
- How do I find a specific citation? I have some information such as the author, journal name, and publication year.
- I retrieved too many citations. How can I focus my search?
- I retrieved too few citations. How can I expand my search?
- How do I find consumer health information about a disease or condition?
- How do I find systematic reviews?
- Are there tools to help with clinical searches or finding medical genetics information?
- I'm not finding what I need. How does a PubMed search work?
- Can you explain what is shown on the search results?
- How do I display an abstract?
- How can I save my results?
- Can I receive email updates when new results are available for my search?
- How do I report an error or duplicate citation in PubMed?
- How can I cite an article or export citations to my citation management software program?
- How do I get a link to bookmark or share my PubMed search?
- How can I download PubMed?
- Is there a guide to NLM resources for MEDLINE/PubMed?
- Where can I find further assistance and training?

Search PubMed

- How do I search PubMed?
- I retrieved too many citations. How can I focus my search?
- I retrieved too few citations. How can I expand my search?
- Find a specific citation
- Searching by author
- Searching by journal

-
-
-
-
-

How do I search PubMed?

1. Identify the key concepts for your search.
2. Enter the terms (or key concepts) in the search box.
3. Press the Enter key or click Search.

   For many searches, it is not necessary to use special tags or syntax. PubMed uses multiple tools to help you find relevent results:

- Best Match sort order uses a state-of-the-art machine learning algorithm to place the most relevant citations at the top of your results.
- An autocomplete feature displays suggestions as you type your search terms. This feature is based on PubMed query log analysis described in " [Finding Query Suggestions for PubMed](#) ."
- A spell checking feature suggests alternative spellings for search terms that may include misspellings.
- A citation sensor displays suggested results for searches that include terms characteristic of citation searching, e.g., author names, journal titles, publication dates, and article titles.

I retrieved too many citations. How can I focus my search?

To limit the number of search results:

- Replace general search terms with more specific ones (e.g., low back pain instead of back pain).
- Include additional terms in your query.
- Use the sidebar filters to restrict results by publication date, full text availability, article type, and more.

I retrieved too few citations. How can I expand my search?

- On the abstract page for a citation, see the [Similar Articles](#) section for a pre-calculated set of additional PubMed citations closely related to that article.
- Remove extraneous or specific terms from the search box.
- Try using alternative terms to describe the concepts you are searching.

Find a specific citation

Paste the article title into the search box, or enter citation details such as the author, journal name and the year the article was published in the search box and the PubMed citation sensor will automatically analyze your query for citation information to return the correct citation. The

citation sensor incorporates a fuzzy matching algorithm and will retrieve the best match even if a search includes an incorrect term. You do not need to use field tags or Boolean operators.

Searching by author

Enter the author's last name and initials without punctuation in the search box, and click Search.

If you only know the author's last name, use the author search field tag [au], e.g., brody[au].

Names entered using either the lastname+initials format (e.g., smith ja) or the full name format (john a smith) and no search tag are searched as authors as well as collaborators, if they exist in PubMed.

Enter a full author name in natural or inverted order, e.g., julia s wong or wong julia s.

- Prior to 2002, full author names were not included on PubMed citations, so full author name searches will only retrieve citations from 2002 forward, when the full author name was published in the article.
- A comma following the last name for searching is optional. For some names, however, it is necessary to distinguish which name is the last name by using the comma following the last name, e.g., james, ryan.

  Omit periods after initials and put all suffixes at the end, e.g., vollmer charles jr

  Initials and suffixes are not required. If you include a middle initial or suffix, you will only retrieve citations for articles that were published using the middle initial or suffix.

  More information about author searching:

- To search by author using the search builder, click Advanced search and then select Author from the All Fields menu. The author search box includes an autocomplete feature.
- You may click an author link on the abstract display to execute a search for the author in PubMed. Results will display using a ranking algorithm if the author name is computationally similar for additional PubMed citations.
- If an author name includes only stopwords, use the author search field tag [au] to search in combination with other terms, e.g., just by[au] seizure.
- Author names are automatically truncated to account for varying initials and designations such as Jr. To turn off the truncation, use double quotes around the author's name with the author search field tag [au], e.g., "smith j"[au].
- Use the search field tag [1au] to search for the first personal author or [lastau] to search for the last personal author name in a citation.

  For additional information on author names in PubMed, please see the journal article, "Author Name Disambiguation for PubMed."

Searching by journal

Enter one of the following in the search box:

- full journal title (e.g., molecular biology of the cell)

- title abbreviation (e.g., mol biol cell)
- ISSN number, a standardized international code (e.g., 1059-1524)

    More information about journal searching:

- To search by journal using the search builder, click Advanced search and then select Journal from the All Fields menu. The journal search box includes an autocomplete feature.
- To find full journal names, use the NLM Catalog, or mouseover the journal title abbreviation on the citation (available in abstract view).
1. Click Journals in NCBI Databases on the PubMed homepage.
2. Enter the journal name and click Search.
- Use the journal search field tag [ta] to limit your search to the journal only, e.g., gene therapy[ta], scanning[ta]
- Searching with the full journal title or abbreviation is recommended for complete retrieval of indexed items; older citations may not have an ISSN.
- If a journal title or abbreviation includes a special character (e.g., parentheses, brackets, &), enter the title or abbreviation without the special characters. For example, to search by the journal abbreviation j hand surg [am], enter j hand surg am.
- Searching for a journal will automatically map to the official journal title and the title associated with an alternative title, if one exists. To turn off this automatic mapping enter the journal in double quotes and tag with [ta], e.g., "science"[ta].

    A list of journals included in PubMed is available by FTP.

Searching by date

Using the results timeline

Click and drag the sliders on the Results by Year timeline to change the date range for your search.

Note: The Results by Year timeline counts all publication dates for a citation as supplied by the publisher, e.g., print and electronic publication dates. These dates may span more than one year; for example, an article that was published online in November 2018 and published in a print issue in January 2019. This means the sum of results represented in the timeline may differ from the search results count.

Using the search builder

1. Click Advanced search and use the search builder.
2. Select a date field from the All Fields menu, e.g., Date – Publication, and enter a single date or a date range in the fill-in-the-blank boxes. Month and day are optional. If you want to search for a date range up to the current date, do not edit the 'Present' date box.
3. Click Search.

Searching by a single date in the search box

Enter dates using the format yyyy/mm/dd [date field]. The available date fields are:

- Date of Publication [dp] - Date searching includes both print and electronic dates of publication. Searching for a single date does not include items when the electronic date of publication is after the print date.

- Electronic Date of Publication (if applicable) [epdat]

- Print Date of Publication (if applicable) [ppdat]

- Entry Date [edat] - The date the citation first entered PubMed (see Entry Date for exceptions).

- MeSH Date [mhda] - The date the citation was indexed with MeSH terms.

- Create Date [crdt] - The date the citation record was first created.

The month and day are optional.

Searching for a date range in the search box

Enter date ranges using a colon (:) between each date followed by a [date field].

Comprehensive searches for a full year should be entered as 2000:2000[dp] rather than 2000[dp] to retrieve citations with a different print and electronic year of publication.

Date range searching includes both print and electronic dates of publication.

Searching for a relative date range

Use the following format to search for a relative date range:

- term="last **X** days"**[date field]**

- term="last **X** months"**[date field]**

- term="last **X** years"**[date field]**

where **X** is the number of days, months or years immediately preceding today's date and **[date field]** is the date field tag: [dp], [edat] or [crdt].

The relative date range search for publication dates will also include citations with publication dates after today's date; therefore, citations with publication dates in the future will be included in the results.

Filters

You can use filters to narrow your search results by article type, text availability, publication date, species, language, sex, subject, journal category, and age.

To apply a filter:

1. Run a search in PubMed.

2. Click the filter you would like to activate from the sidebar. A check mark will appear next to the activated filter(s).

3. Subsequent searches will be filtered until the selected filters are turned off, or until your browser data is cleared.

The most popular filters are included on the sidebar by default. To display additional filters on the sidebar:

1. Click the "Additional filters" button.
2. A pop-up menu will appear showing the available filters for each category: article type, species, language, sex, subject, journal, and age.
3. Choose a category from the list of options on the left side of the menu: Article Type, Species, etc.
4. Within each category, select the filters you would like to add to the sidebar.
5. Click Apply. This will close the pop-up menu and display your selections on the sidebar with the other filters.
6. If you would like to cancel your selections, click Cancel or click on the X in the upper right corner to close the pop-up and return to your search results.
7. To apply the filter(s) to your search, click the filter(s) on the sidebar.

More information about filters:

- When filters are selected a "Filters applied" message will display on the results page.
- Click an applied filter to turn it off.
- To turn off all applied filters, click the "Clear all" link or the "Reset all filters" button.
- Citations may be excluded for some filter selections because they have not yet completed the MEDLINE indexing process.
- You can also activate additional filters with My NCBI filters.

Article type

Select article types to narrow your results based on the type of material the article represents, such as: Clinical Trial or Review.

You can add more article types to the sidebar using the Additional Filters button. The complete list of MEDLINE publication types is available. Systematic review articles are retrieved using a search strategy.

These filters may exclude some citations that have not yet completed the MEDLINE indexing process.

Text availability

To filter your results to only citations that include a link to full text, a link to free full text, or an abstract, click the appropriate selections.

Alternatively, you may search for citations with links to full text, free full text or include an abstract using the values: full text[sb], free full text[sb], or 'hasabstract'. No search field tag is required for hasabstract. You may also search for all MEDLINE citations with a structured abstract with 'hasstructuredabstract'.

Note: Most citations in PubMed to articles published before 1975 do not include abstracts.

Publication date

To filter your results by Publication Date, click 1 year, 5 years, or 10 years. These filters include both electronic and print publication dates.

Species

Species selections restrict your results to human or animal studies.

You can add species filters to the sidebar using the Additional Filters button.

These filters may exclude some citations because they have not yet completed the MEDLINE indexing process.

Language

Language selections restrict your search to articles written in that language.

You can add language filters to the sidebar using the Additional Filters button.

Sex

Sex restricts your search results to a specific sex for an animal or human study.

You can add sex filters to the sidebar using the Additional Filters button.

This filter may exclude some citations because they have not yet completed the MEDLINE indexing process.

Subject

Subject filters restrict retrieval to specific subjects, such as:

- AIDS
- Cancer
- Systematic Reviews

To add these subjects to the sidebar, use the Additional Filters button.

Subjects use a specialized search strategy. More subject filters and the subject filter search strategies are available at PubMed Subject Filters.

Subjects can also be searched using aids[sb] or cancer[sb]. The Systematic Reviews filter is also included with the Article Type filters.

Journal categories & more subsets

Select journal categories can be added to the sidebar using the Additional Filters button:

- Dental journals
- MEDLINE

- Nursing journals

The Journal/Citation subsets restrict retrieval to specialized journals or articles on specialized topics in other journals. The table below lists the journal subsets, along with the code used for searching. Some subsets are closed and are no longer being assigned to current data.

To search for a Journal/Citation subset, enter in the search box: jsubset?, where ? represents the subset code. The Journal/Citation subset does not require a search tag.

Subset Code	Journal/Citation Subset
AIM	Abridged Index Medicus is a list created in 1970 of approximately 120 core clinical English language journals that corresponds to "Core clinical journals" journal category selection in filters.
D	Dentistry journals
E	Citations from bioethics journals or selected bioethics citations from other journals
H	Health administration journals, non-Index Medicus
IM	Index Medicus journals
K	Consumer health journals
N	Nursing journals
Q	History of medicine journals and selected citations from other journals
QIS	Citations from non-Index Medicus journals in the field of history of medicine
S	Citations from space life sciences journals and selected space life sciences citations from other journals
T	Health technology assessment journals, non-Index Medicus
X	AIDS/HIV journals (selected citations from other journals 1980-2000)

PubMed Central Subset

To restrict retrieval to citations that have a free full-text article available in PubMed Central (PMC), search pubmed pmc[sb].

Use the PMID/PMCID/NIHMSID Converter to convert IDs for publications referenced in PubMed and PMC. To retrieve citations that include an NIHMS ID use the query, hasnihmsid.

Citation Status Subsets

The citation status indicates the internal processing stage of an article in the PubMed database (see PubMed Citation Status Subsets).

To search for a particular citation status, enter one of the search terms below followed by the [sb] search tag:

- publisher
- inprocess
- medline
- pubmednotmedline

To search for the total number of PubMed citations, enter all[sb] in the search box.

Ahead of Print Citations

Publishers may submit citations for articles that appear on the web prior to their publication in final or print format. To search for these ahead-of-print citations, enter pubstatusaheadofprint.

Age

Age filters restrict results to a specific age group for a human study.

You can add age filters to the sidebar using the Additional Filters button.

Age filters include:

- Child: birth-18 years
- Newborn: birth-1 month
- Infant: birth-23 months
- Infant: 1-23 months
- Preschool Child: 2-5 years
- Child: 6-12 years
- Adolescent: 13-18 years
- Adult: 19+ years
- Young Adult: 19-24 years
- Adult: 19-44 years
- Middle Aged + Aged: 45+ years
- Middle Aged: 45-64 years
- Aged: 65+ years
- 80 and over: 80+ years

These filters may exclude some citations because they have not yet completed the MEDLINE indexing process.

Searching for a phrase

PubMed does not perform adjacency searching. However, many phrases are recognized by the subject translation table used in PubMed's Automatic Term Mapping (ATM). For example, if you enter fever of unknown origin, PubMed recognizes this phrase as a MeSH Term.

You can bypass ATM and search for a specific phrase using the following formats:

- Enclose the phrase in double quotes: "kidney allograft"

o If you use quotes and the phrase is not found in the phrase index, the quotes are ignored and the terms are processed using automatic term mapping.

- Use a search tag: kidney allograft[tw]

o If you use a search tag and the phrase is not found in the phrase index, the phrase will be broken into separate terms, e.g., "psittacine flight" is not in the phrase index, so a search for psittacine flight[tw] is broken up and translated as: ((("psittaciformes"[MeSH Terms] OR "psittaciformes"[All Fields]) OR "psittacine"[All Fields]) OR "psittacines"[All Fields]) AND "flight"[Text Word]

- Use a hyphen: kidney-allograft

o If you use a hyphen and the phrase is not found in the phrase index, the search will not return any results for that phrase.

Phrases may appear in a PubMed record but not be in the phrase index. To browse indexed phrases, use the [Show Index feature](#) included in the Advanced Search Builder: select a search field, enter the beginning of a phrase, and then click Show Index.

When you enter search terms as a phrase, PubMed will not perform automatic term mapping that includes the MeSH term and any specific terms indented under that term in the MeSH hierarchy. For example, "health planning" will include citations that are indexed to the MeSH term, Health Planning, but will not include the more specific terms, e.g., Health Care Rationing, Health Care Reform, Health Plan Implementation, that are included in the automatic MeSH mapping.

Truncating search terms

To search for all terms that begin with a word, enter the word followed by an asterisk (*): the wildcard character.

To search for a phrase including a truncated term, use the following formats:

- Enclose the phrase in double quotes: "breast feed*"

- Use a search tag: breast feed*[tiab]

- Use a hyphen: breast-feed*

At least four characters must be provided in the truncated term.

The truncated term must be the last word in the phrase.

Truncation stops at the end of a term; it does not process beyond a space.

Truncation turns off automatic term mapping and the process that includes the MeSH term and any specific terms indented under that term in the MeSH hierarchy. For example, heart attack* will not map to the MeSH term Myocardial Infarction or include any of the more specific terms, e.g., Myocardial Stunning; Shock, Cardiogenic.

Combining search terms with Boolean operators (AND, OR, NOT)

PubMed applies an AND operator between concepts, e.g., "vitamin c common cold" is translated as vitamin c AND common cold. Enter Boolean operators in uppercase characters to combine or exclude search terms:

- AND retrieves results that include all the search terms.

- OR retrieves results that include at least one of the search terms.

- NOT excludes the retrieval of terms from your search.

  PubMed processes searches in a left-to-right sequence. Use parentheses to "nest" concepts that should be processed as a unit and then incorporated into the overall search.

  Boolean operators must be used when combining tagged search terms as follows: search term [tag] BOOLEAN OPERATOR search term [tag]. See Search Field descriptions and tags.

- PubMed uses automatic term mapping to identify concepts. For example, for the search air bladder fistula, PubMed will search "air bladder" as a phrase. If you do not want this automatic phrase parsing, enter each term separated by the Boolean operator AND, e.g., air AND bladder AND fistula.

- Search Details show how a search was translated.

Display, Sort, and Navigate

- Understanding your search results
- Display an abstract
- Changing the display format of search results
- Showing more results
- Sorting your results
- Finding the full-text article
- Similar articles
- References
- Cited by
- Find related resources using LinkOut
- Reporting broken or problem links

Understanding your search results

Citations are initially displayed 10 items per page and sorted by Best Match.

By default, PubMed search results are displayed in a summary format and include snippets from the citation abstract. Snippets and highlighted terms are selected based on relatedness to your query.

To see the abstract for an individual citation, click the title of the citation to go to its abstract page.

PubMed may also include non-English abstracts, if supplied by the publisher. The additional language view links are available on the Abstract display. The abstract text defaults to English when a citation has an accompanying non-English abstract. To retrieve citations with non-English abstracts, use the query hasnonenglishabstract.

You can mouseover a journal's title abbreviation to display the full journal name.

Display an abstract

Click the title of the citation to go to its abstract page, or change the search results display to Abstract format using the Display options button in the upper right corner of the search results page.

Changing the display format of search results

Results are initially displayed in the summary format, except a single citation result will display the abstract format. You can change the results display using the Display options button:

1. Click the Display options button in the upper right corner of the search results page
2. Select the display format you would like to use: Summary or Abstract

Showing more results

The results page indicates the total number of items retrieved.

Ten items are displayed per page by default. You can change the number of items displayed per page using the Display options button:

1. Click the Display options button in the upper right corner of the search results page
2. Select the number of items to display per page: 10, 20, 50, 100, or 200
3. Your selection will be active for subsequent searches until your browser cookies are cleared.

   Click "Show more" to display the next page of results, or click "Jump to page" to navigate directly to a specific page of results.

Sorting your results

Click the Display options button in the upper right corner of the search results page to change the sort order:

- Best Match: By default, results are sorted by Best Match. The Best Match sort order is based on an algorithm that analyzes each PubMed citation found with your search terms. For each search query, "weight" is calculated for citations depending on how many search terms are found and in which fields they are found. In addition, recently-published articles are given a somewhat higher weight for sorting. The top articles returned by the weighted term frequency algorithm above are then re-ranked for better relevance by a new machine-learning algorithm. Please see the [Algorithm for finding best matching citations in PubMed](#) for more information.

- Most Recent: Citations sorted by Most Recent are displayed in reverse date added order: last in, first out. The Most Recent date is the date a record was initially added to PubMed, not the publication date. The secondary sort is PMID.

- Publication Date: Citations sorted by Publication Date are displayed in reverse chronological order: newest to oldest. Citations with more than one publication date, such as electronic and print, are sorted by their earliest publication date. Publication dates without a month are set to January, multiple months (e.g., Oct-Dec) are set to the first month, and dates without a day are

set to the first day of the month. Dates with a season are set as: winter = January, spring = April, summer = July and fall = October.

Reverse sort order:

- When sorting by Most Recent or Publication Date, you can reverse the sort order by clicking the Display options button and then clicking the up/down arrow next to the selected sort by option to toggle between ascending or descending order.
- The reverse sort option will only display when the Most Recent or Publication Date sort order is selected.

More information about sorting:

- If you change the sort order, your new selection will be active for subsequent searches until your browser cookies are cleared.
- You may click an author link on the abstract display to execute a search for the author in PubMed. If an author name is computationally similar with an author name for additional PubMed citations, the results will display those citations first, in ranked order, followed by the non-similar citations. Author name disambiguation details are available in Liu W and Wilbur WJ .

Finding the full-text article

PubMed records contain citation information (e.g., title, authors, journal, publication date) and abstracts of published articles and books. PubMed search results do not include the full text of the journal article, but the abstract view in PubMed includes links to the full text from other sources when available, such as the publisher's website or the PubMed Central (PMC) database. The full-text journal site may require a fee or subscription, however online journals sometimes provide free access. Access may also be available through your organization, or local medical library.

You may be able to obtain free copies of full-text articles in these ways:

Free full text filter

On the filter sidebar, click "Free full text" to narrow results to resources that are available for free on the web, including PubMed Central, Bookshelf, and publishers' websites. Alternately, include free full text[Filter] in your query.

PubMed Central

When full text is available in PubMed Central (PMC), the "Free in PMC" icon will appear on the citation's abstract display under Full-Text Links. Click the icon to view the article in PMC.

PubMed Central (PMC) is the U.S. National Institutes of Health (NIH) free digital archive of biomedical and life sciences journal literature.

From the publisher

Journal publishers or related organizations may provide access to articles for free, for free after registering as an individual or guest, or for a fee. When provided by the publisher or other

organization, icons linking to these sources can be found on the citation's abstract display under the "Full-Text Links" and/or "LinkOut" sections. Icons will often indicate free full text when the article is available for free.

Note: When you click a full text icon or link in PubMed, you leave PubMed and are directed to the full text at an external provider's site. NCBI does not hold the copyright to this material, and cannot give permission for its use. Users should review all copyright restrictions set forth by the full text provider before reproducing, redistributing, or making commercial use of material accessed through LinkOut.

Please see the Copyright and Disclaimers page for additional information.

If you are affiliated with a hospital, university, or other institution

Your local medical library is your best option. If you see icons for your library on the abstract view this indicates that your library provides a link to the article, has the journal in its collection, or may otherwise obtain the article for you through interlibrary loan. If your library does not have access to the article you need, ask a librarian about ordering the article from another institution.

Local library

Some local libraries have copies of medical journals or can get a copy of an article for you. Ask your local librarian about inter-library loan options and fees.

Similar articles

The abstract page for a citation includes links to PubMed citations for similar articles. The "See all similar articles" link will retrieve a pre-calculated set of PubMed citations that are closely related to the selected article:

- Similar articles are displayed in ranked order from most to least relevant, with the "linked from" citation displayed first.
- Similar articles are generated by comparing words from the title, abstract, and MeSH terms using a word-weighted algorithm.
- Filters are not activated for similar articles.
- You can refine the list of similar articles using your search History, where the similar articles retrieval is represented as a list of PMIDs. Use this search number in a search. Refining the list removes the ranked order and may remove citations that are most relevant.

See Computation of similar articles for more information.

References

PubMed abstracts include references when available. Reference lists are available for citations to full-text articles included in PMC and for citations where the publisher supplied references in the citation data sent to PubMed.

Cited by

PubMed abstracts include links to other resources citing the current item. "Cited by" is generated using data submitted by publishers and from NCBI resources, when available. "Cited by" may not be a complete list of works citing a particular item.

Find related resources using LinkOut

Most PubMed records include LinkOut resources to a variety of websites including publishers, aggregators, libraries, biological databases, and sequence centers. LinkOut resources link to providers' sites to obtain the full-text of articles or related information, e.g., consumer health. There may be a charge to access the text or information from a provider's site.

To view LinkOut resources, navigate to the LinkOut section at the end of an individual citation's abstract page.

To find citations with links to free full-text articles, apply the "Free full text" filter to your search results.

To find citations with links to full-text articles, enter search terms followed by AND full text[sb].

More information about Links:

- LinkOut resource categories such as "free full text" have been selected by the LinkOut provider.
- The current list of LinkOut providers is available.
- A publisher's icon link may display on the abstract format if they have electronically provided their citation data to NCBI. Links are only available for publishers that are participating in LinkOut; publishers are responsible for providing working links.

Reporting broken or problem links

LinkOut links are supplied by the LinkOut providers. Publishers who electronically supply their data to PubMed may include an icon that links to a site providing the full-text. Corrections and changes to links are made by the providers and are their responsibility.

To report problem links or inquire about online journal subscriptions, contact the provider directly. Contact information is typically available at a provider's web site.

Cite, Save, and Share

- Save citations temporarily using the Clipboard
- Save citations indefinitely using My NCBI Collections
- Save citations as a text file
- Cite an article
- Export citations into citation management software
- Email citations
- Create an email alert for a search
- Create an RSS feed for a search
- Print your search results

- [Get a permalink to bookmark or share your search](#)

- [Download PubMed data](#)

Save citations temporarily using the Clipboard

The Clipboard provides a place to collect up to 500 items from one or more searches. Items saved to the Clipboard will expire after 8 hours of inactivity.

To add items to the Clipboard:

1. Use the check boxes to select items from your search results. To save all results (up to a maximum of 500), do not tick any check boxes.
2. Use the Send to button and choose Clipboard.
3. Selected items will be added to the Clipboard.
o If no items were selected, a drop-down menu of options will display where you may add selected items, all results on the page, or all results (up to a maximum limit of 500 citations) to the Clipboard.
o An individual item can also be added to the Clipboard from its abstract page.
4. To view your selections, click the Clipboard link under the Search bar. This link will only appear after one or more items have been added to the Clipboard; the link is not present when the Clipboard is empty.

To delete items from the Clipboard:

- On the Clipboard page, click "Remove from Clipboard" below each item to delete the item from the Clipboard.

- Select one or more items using the check boxes next to each item, then click "Remove selected items."

- To delete all items from the Clipboard, click "Remove all."

More information about the Clipboard:

- Citations added to the Clipboard are marked with the message "Item in Clipboard" in search results.

- The maximum number of items that can be sent to the Clipboard is 500. If you select Clipboard from send to without selecting citations, PubMed will add all (up to 500 citations) of your search results to the Clipboard.

- The Clipboard will not add a citation that is currently in the Clipboard; it will not create duplicate entries.

- Your web browser must accept [cookies](#) to use the Clipboard.

- Citations in the Clipboard are represented by the search number #0, which may be used in Boolean search statements. For example, to limit the citations you have collected in the Clipboard to English language articles, use the following search: #0 AND english [la]. This does not affect or replace the Clipboard contents.

Save citations indefinitely using My NCBI Collections

Search results can be saved in My NCBI using the [Collections](#) feature. There is no limit to the number of collections you may store in My NCBI. In addition, collections can be made public to share with others.

To save results to a new collection:

1. Sign into My NCBI. Run a search in PubMed.

2. Use the check boxes to select items from your search results or Clipboard. To save all results (up to a maximum of 1,000), do not tick any check boxes.

3. Use the Send to button and choose Collections.

4. Selected items will be added to a Collection.

o If no items were selected, a drop-down menu of options will display where you may add selected items, all results on the page, or all results (up to a maximum limit of 1,000 citations) to a Collection.

o An individual item can also be added to a Collection from its abstract page.

5. Choose Create a new collection.

6. Name your collection using a short, meaningful title. The name must be less than 100 characters. Identical names for different Collections are allowed and may cause confusion.

7. Click Add to finish.

As you continue to build collections, you may want to add new items to an existing collection. To add search results to an existing collection:

1. Follow steps 1 - 4 above. Add to an existing collection will be the default selection.

2. Use the pull-down menu to choose a collection.

3. Click Add to finish.

For more information on viewing, sorting, editing, merging, sharing, and deleting collections, see [Collections](#) in My NCBI Help.

Save citations as a text file

Use the Save button to download citations to a text file.

1. Use the check boxes to select citations from your search results or Clipboard. You may move to other pages to continue your selections. If you do not make any selections, you can choose to save "All results on this page" or "All results" from the Save menu.

2. Click Save and choose a Selection and Format from the menu that appears.

o Selection: The citations you would like to save.

▪ Selection: The number of selected items will be shown, for example: Selection (87).

▪ All results on this page

▪ All results (up to a maximum of 10,000 citations)

o Format: Summary (text), [PubMed](#), PMID list, Abstract (text), or CSV

3. Click Create file.

4. Your web browser will prompt you to save the file on your computer.

More information about saving citations to a file:

- Saving a large set of results may take several minutes.

- To save citations in HTML format, use the "Save" or "Save as" function of your browser and change the file extension to html. When saving as HTML, only those citations displayed on the page will be saved; therefore, consider showing more results.

Cite an article

The Cite button makes it easy to retrieve styled citations that you can copy and paste into a document, or download an .nbib file to use with your reference manager software.

Using the Cite button for an item will open a pop-up window where you can copy the citation formatted in four popular styles: AMA (American Medical Association), MLA (Modern Language Association), APA (American Psychological Association), or NLM (National Library of Medicine). You can also download the citation as an .nbib file, which most bibliographic reference management software can import.

Note: In all citation styles, there are certain capitalization rules that machines cannot handle. For example, there is no way to identify proper nouns, acronyms, abbreviations, etc., that is 100% accurate and complies with all rules at all times. Capitalization of article titles and other citation elements should be checked for compliance with a particular reference style when required.

To export multiple citations: follow the instructions for saving citations as a text file and choose the format Summary (text) to save a list of citations in NLM style, or follow the instructions to export citations into your citation management software program.

Export citations into citation management software

Use Send to: Citation Manager to export citations as an .nbib file that can be used by many citation management programs:

1. Use the check boxes to select citations from your search results or Clipboard. You may move to other pages to continue your selections. Alternately, you can choose to save all results on this page or all results from the Send to: Citation Manager menu.
2. Click Send to and choose Citation Manager.
3. Confirm the citations you want to export: selection, all results on this page, or all results (up to a maximum of 10,000).
4. Click Create file.
5. Your web browser will prompt you to save the file on your computer.
6. Import this saved file into your citation management program.

You can also download an .nbib file for individual citations using the Cite button.

Questions regarding citation management software should be directed to the respective companies.

Email citations

1. Use the check boxes to select citations from your search results or Clipboard. You may move to other pages and continue your selections. You may also choose to email all citations shown on the page without making any selections.

2. Click the Email button.

3. Enter an email address, subject line, and any additional text you would like to include in the body of the email. Select which citations to send and the format.

4. Click Send email. The system returns you to your results page and displays a confirmation e-mail sent message.

   More information about emailing citations:

- Your citations will be sent from the NCBI automatic mail server with the sender's email address [nobody@ncbi.nlm.nih.gov]. Do not reply to this message, as this is not a functioning customer service email address and is not monitored.

- The CAPTCHA image does not display for users who are signed in to My NCBI.

Create an email alert for a search

Click "Create alert" under the search bar to create an automatic email update for searches. You must sign in to My NCBI to use this feature.

Create an RSS feed for a search

Click on Create RSS under the search box at the top of the page to create an RSS feed for your search.

1. The RSS feed name will default to the search terms. You can edit the RSS feed name as needed.

2. Use the pull-down menu to select the number of items displayed (up to 100).

3. Click the Create RSS button.

4. The RSS Feed Link will appear; click on Copy to copy the link.

5. Use this link with your feed reader or other application.

Print your search results

Use the print function of your web browser. To print citations from different searches, save the citations in [PubMed's Clipboard](#), and then print.

See also:

- [Showing more results](#)
- [Changing the display format](#)

Get a permalink to bookmark or share your search

To get the URL for an individual citation, copy the permalink for the citation under "Share."

To get the URL for your search results, copy the URL from your web browser's address bar or bookmark the URL using your web browser's bookmark function.

To create a URL manually:

1. Use the base URL: https://pubmed.ncbi.nlm.nih.gov/?term=search

2. Replace "search" in the base URL with your query terms

3. Escape spaces by converting them to plus signs (+); for example, Biochem Soc Trans should be entered as: Biochem+Soc+Trans

The number of characters you can use may be limited by your browser's maximum URL length (which may be different for each browser).

Search PubMed for articles about antioxidant and chocolate:

https://pubmed.ncbi.nlm.nih.gov/?term=antioxidant+chocolate

Optional search parameters:

- format=summary, abstract
- sort=relevance, date, pubdate
- sort_order=asc
- size=10, 20, 50, 100, 200

Search PubMed for articles about breast cancer, sorted by ascending publication date (oldest to newest), and display 50 citations per page:

https://pubmed.ncbi.nlm.nih.gov/?term=breast+cancer&sort=pubdate&sort_order=asc&size=50

More information about PubMed links:

- Some settings in PubMed rely on cookies and other session data that may not be present in the URL. For example, searches that were created using a search number in Advanced History (e.g., #1 OR #2 AND human[mh]) cannot be saved using the URL because the search will be lost when your History expires.

- Users intending to send frequent queries or retrieve large numbers of records from the NCBI databases should use E-Utilities. Users must comply with the usage guidelines and requirements to prevent overloading NCBI systems.

- The NCBI Disclaimer and Copyright notice must be evident to users. Users are advised to consult legal counsel to ensure compliance with intellectual property laws. NLM cannot provide advice about copyright issues.

Download PubMed data

Once a year, NLM releases a complete (baseline) set of PubMed citation records in XML format for download from our FTP servers. Incremental update files are released daily and include new, revised, and deleted citations. The PubMed DTD states any changes to the structure and allowed elements from year to year.

- Documentation: 2019 PubMed XML Elements and Attributes
- Terms and Conditions

- [PubMed 2019 Baseline](#)
- [Pubmed 2019 Update Files](#)
- [PubMed DTD](#)

Advanced Search

- [Searching by a specific field](#)
- [Browsing the index of terms](#)
- [History](#)
- [Previewing the number of search results](#)
- [Combining searches using History](#)
- [Viewing the Search Details](#)

Tools included on the [Advanced Search](#) page help users to: search for terms in a specific field, combine searches and build large, complex search strings, see how each query was translated by PubMed, and compare number of results for different queries.

Searching by a specific field

Use the Advanced Search Builder to search for terms in a specific field, such as author or journal. For some fields, an autocomplete feature will provide suggestions as you type.

1. From the "All Fields" drop-down menu, select the field you would like to search.
2. Add terms from the builder to the query box to construct your search. The default Boolean operator is AND; if desired, choose OR or NOT from the pull-down menu.
3. Once you have finished adding terms to the query box, click Search (or Add to History) to run the search.

   You may also search a specific field -- and bypass automatic term mapping -- by adding a search tag to a term (see: [Search Field descriptions and tags](#)).

- The search tag must be enclosed in square brackets.
- Case and spacing do not matter (e.g., crabs [mh] = Crabs[mh]).

Browsing the index of terms

The Advanced Search Builder includes the Show Index feature, which provides an alphabetical display of terms appearing in selected PubMed search fields. You can browse by all fields or within specific fields such as MeSH Terms.

1. Click Advanced to navigate to the [Advanced Search](#) page, and use the Builder to select a search field from the All Fields menu. Note: Show Index is not available for every search field. The Show Index link will only display for fields that are compatible with this feature.
2. Enter a term in the search box, then click Show Index.
3. The index displays an alphabetic list of search terms and the approximate number of citations for each term (the actual citation count is returned when the search is executed).

4. Scroll until you find a term you want to include in your search, and then highlight it to add it to the search box.

5. Multiple terms may be selected from the list and added to the search box.

6. Add terms from the builder to the query box to construct your search.

7. Once you have finished adding terms to the query box, click Search (or Add to History) to run the search.

   More information about using the index:

- PubMed processes all Boolean operators left to right.

- The builder will automatically OR (and add parentheses) for multiple terms selected from the index.

- A slash will display after a space. For example, the MeSH Term and Subheading "zika virus/analysis" will display after "zika virus infection/virology." Enter MeSH terms followed by a slash to go directly to the display for the MeSH/Subheading combination counts in the index.

- Show Index is not available for date fields.

History

Your PubMed search history appears on the [Advanced Search](#) page under History. This feature requires your web browser to accept cookies.

Descriptions of each column in the History table appear below:

- Search: Searches are numbered in chronological order.

o Search numbers may be used in place of the search string itself when combining queries (e.g., #1 OR #2).

o A repeated query will move to the top of History but will retain its original numbering.

o History is limited to the last 100 searches. Once the maximum number is reached, PubMed will remove the oldest search from history and add the most current search.

- Actions: Add, delete, or save a query. Adding queries from History places the search string into the Query box to be used in the next search. Deleting a query removes it from History.

- Query: This column shows previous search strings as entered by the user.

- Details: PubMed may modify or add search terms to a search to optimize retrieval, e.g., using automatic term mapping. Click the chevron icon " > " to expand search details and see how the search was translated.

- Results: The total number of citations retrieved for that query. Click the number to run the search and see the results in PubMed.

- Time: Timestamp of when the search was conducted.

- Download: Click Download to generate a CSV file of current History items.

o Please note, Microsoft Excel is typically unable to display or print more than a maximum of 1024 characters in a cell; therefore, you may want to open the CSV file with a text editor to display your complete searches.

- Delete: Click "Delete" to remove all queries from History; otherwise, History expires after 8 hours of inactivity.

Previewing the number of search results

1. Click Advanced to navigate to the Advanced Search page.
2. Use the builder to add search terms to the query box, or type your search directly into the query box.
3. Use the split button to toggle the button function from "Search" to "Add to History".
4. Click Add to History. This will run the search without leaving the Advanced Search page.
5. See your query including the number of results in the History table.

Combining searches using History

Searches can be combined or used in later searches using your search History.

1. Click Advanced to navigate to the Advanced Search page.
2. In the History table, click the More Actions icon " ... " next to your query.
3. From the available options, select "Add query" to copy the query to the Query box.
4. After you've added content to the Query box, options to use the Boolean operators AND, OR, or NOT will appear when adding more queries to the Query box.
5. Edit your query in the Query box if you would like to make any changes before running the search.
6. Click Search (or Add to History).

   More information about combining searches from your History:

- Search numbers may be used in place of the search string itself when combining queries (e.g., #1 OR #2).
- Citations in the Clipboard are represented by the search number #0, which may be used in searches. For example, to limit the citations you have collected in the clipboard to English language citations, use the following search: #0 AND english [la]. This does not change or replace the Clipboard contents.

Viewing the Search Details

PubMed may modify or add additional search terms to your search to optimize retrieval, such as: MeSH terms, British/American spellings, singular/plural word forms, and other synonyms.

1. Search Details are included on the Advanced Search page under History.
2. Click the chevron icon " > " next to a query in History to expand the Search Details.
3. When expanded, the details below a query in the History table show the search strategy used to run the search.

Other services

- Clinical Queries
- Finding a citation using the Single Citation Matcher

- [Search PubMed using the MeSH database](#)
- [Searching for journal information in the NLM Catalog](#)
- [Using the E-Utilities API tools](#)
- [Find PMIDs using the Batch Citation Matcher](#)
- [Consumer health](#)

Clinical Queries

[PubMed Clinical Queries](#) provides specialized searches for clinicians:

- [Clinical Study Categories](#): Clinical search filters based on the work of Haynes RB et al.
- [Systematic Reviews](#): A customized search strategy to retrieve a broad set of citations that build consensus on biomedical topics and include: systematic reviews, meta-analyses, reviews of clinical trials, evidence-based medicine, consensus development conferences, guidelines, and citations from journals specializing in clinical review studies.
- [Medical Genetics](#): Search filters developed in conjunction with the staff of GeneReviews: Genetic Disease Online Reviews at GeneTests, University of Washington, Seattle.

Search by clinical study category

Clinical Study Categories use a specialized search method with built-in search filters that limit retrieval to citations to articles reporting research conducted with specific methodologies, including those that report applied clinical research.

To find citations using the Clinical Study Category:

1. Click Clinical Queries from the PubMed homepage
2. Enter your search terms in the search box
3. Click Search
4. Select a Category: Therapy, Diagnosis, Etiology, Prognosis, or Clinical prediction guides
5. Select a Scope: Narrow (specific search) or Broad (sensitive search)
6. See results in the Clinical Study Categories column

Finding systematic reviews

In PubMed, Systematic Reviews cover a broad set of articles that build consensus on biomedical topics. A list of related sources on this topic is available.

To search for systematic reviews:

1. Click Clinical Queries from the PubMed homepage
2. Enter your search terms in the search box
3. Click Search
4. See results in the Systematic Reviews column

Alternatively, use the [article type filter] for systematic reviews, or enter search terms followed by AND systematic[sb] in the search box. For example, lyme disease AND systematic[sb].

To search for citations assigned the Systematic Review publication type, use the publication type search tag[pt], i.e., systematic review[pt].

Medical genetics searches

In PubMed, Medical Genetics finds citations related to various topics in medical genetics.

1. Click Clinical Queries from the PubMed homepage
2. Enter your search terms in the search box
3. Click Search
4. Choose a specific topic, if applicable
5. See results in the Medical Genetics column

Finding a citation using the Single Citation Matcher

The Single Citation Matcher has a fill-in-the-blank form for searching for a citation when you have some bibliographic information, such as journal name, volume, page number.

- Click Single Citation Matcher on the PubMed homepage.
- Enter the citation information.
- Click Go.

  More information about using the Single Citation Matcher:

- The journal box includes an autocomplete feature that suggests titles as you enter a title abbreviation or full title. Titles displayed by the autocomplete menu are in ranked order based on the number of citations in PubMed.
- After selecting a journal with special characters (e.g., ampersand, colon) when using the Back button to return to the Single Citation Matcher you must clear and reenter the title.
- The author box also includes an autocomplete feature that suggests author names in ranked order based on the number of citations. Full author names may be searched for citations published from 2002 forward if the full author name is available in the article.
- Click either the 'Only as first author' or 'Only as last author' check box to limit an author name to the first or last author.

Search PubMed using the MeSH database

[MeSH] (Medical Subject Headings) is the NLM controlled vocabulary thesaurus used for indexing PubMed citations.

Use the [MeSH database] to find MeSH terms, including Subheadings, Publication Types, Supplementary Concepts and Pharmacological Actions, and then build a PubMed search. The MeSH database can be searched by MeSH term, MeSH Entry Term, Subheading, Publication Type, Supplementary Concept, or MeSH Scope Note.

More information about the MeSH database:

- An autocomplete feature is available from the search box.

- Search results are displayed in relevance-ranked order, therefore, when a user's search exactly matches a MeSH Term, that Term is displayed first.

- Click the MeSH term from the Summary display or choose Full from the display format menu to view additional information and search specifications, such as Subheadings, restrict to Major MeSH Topic, or exclude terms below the term in the MeSH hierarchy.

- Year Introduced is the year the term was added to MeSH. If more than one year is shown, the term was available for indexing back to the earliest year noted. Articles are indexed using the vocabulary in place at the time of indexing, therefore, the year introduced for a term and the date of publication of a citation indexed with that term may not agree.

Launching PubMed searches from the MeSH database

To build a PubMed search from MeSH:

1. Run a search in the MeSH database.
2. Select terms using the check boxes.
3. Click "Add to search builder" in the PubMed search builder portlet.
4. You may continue searching and including additional terms to the PubMed search builder using the "Add to search builder" and Boolean pull-down menu.
5. When you are finished, click "Search PubMed."

Searching for journal information in the NLM Catalog

The NLM Catalog includes information about the journals in PubMed and the other NCBI databases.

Click Journals in NCBI Databases on the homepage of NLM Catalog or the Journals link on the PubMed homepage to limit your NLM Catalog results to the subset of journals that are referenced in NCBI database records.

See the NLM Catalog help for additional information.

Other journal resources include:

- PubMed journals with links to full-text
- List of all journals included in PubMed via FTP
- List of Serials Indexed for Online Users

Using the E-Utilities API tools

E-utilities are tools that provide access to data outside of the regular NCBI web search interface. This may be helpful for retrieving search results for use in another environment. If you are interested in large-scale data mining on PubMed data, you may download the data for free from our FTP server. Please see the terms and conditions for data users.

Find PMIDs using the Batch Citation Matcher

Use the Batch Citation Matcher to retrieve PMIDs (PubMed IDs) for multiple citations in batch mode. The Matcher requires you enter the bibliographic information (journal, volume, page, etc.) in a specific citation format.

To retrieve PubMed PMIDs or PubMed Central IDs:

1. Enter each citation string on a separate line below, or create a file using the following format:
   journal_title|year|volume|first_page|author_name|your_key|
   Fields must be separated by a vertical bar with a final bar at the end of the string.

2. Enter your email address. Email messages may take several minutes to process and be sent to your email address.

3. If you created a file, click Browse to select it from your system directory.

   If a match is not found the citation string will display one of the following:

- INVALID_JOURNAL - The journal name is not a valid. See the journal lists or the NLM Catalog to find the correct journal abbreviation.

- NOT_FOUND - The journal name is valid but the complete citation did not find a match.

- AMBIGUOUS - The information provided matches more than one citation. Citation information with 3 or fewer matches include the PMIDs, and more than 3 matches include the total PMID match count. Use the Single Citation Matcher or ESearch to retrieve all citations for searched fields.

   Notes:

- Select PMC from the database pull-down menu to change the default from PubMed.

- Enter author names without punctuation as smith jc. Initials are optional.

- Your key is any string you choose to tag the citation, it is returned unaltered.

- The journal title field may include the full journal title or the title abbreviation.

- Each citation field is searched starting with the journal title until a unique match is found.

- The journal title is a required field however you may omit other fields. If you omit fields you must retain the vertical bars in the citation string. For example, if you omit the volume number 88 from the first example below it should be entered as:
  proc natl acad sci u s a|1991||3248|mann bj|P32022-1|

   Example input:

- proc natl acad sci u s a|1991|88|3248|mann bj|P32022-1|

- proc natl acad sci u s a|1992|89|3271|gould se|P26261-1|

- proc natl acad sci u s a|1999|89|3271|gould se|P26261-1|

- res microbiol|1992|143|467|ivey dm|P25966-1|

- science|1987|235|182|palmenberg ac|P12296-2|

- eschatology|1993|12|22|public jq|C12233-2|

- virology|1993|193|492|hardy me|Q02945-1|

- virus genes|1992|6|393||P27423-1|
- yeast|1992|8|253|sasnauskas k|P24813-1|

Example output:

- proc natl acad sci u s a|1991|88|3248|mann bj|P32022-1|2014248
- proc natl acad sci u s a|1992|89|3271|gould se|P26261-1|1565618
- proc natl acad sci u s a|1999|89|3271||P26261-1|NOT_FOUND
- res microbiol|1992|143|467|ivey dm|P25966-1|1448623
- science|1987|235|182|palmenberg ac|P12296-2|3026048
- eschatology|1993|12|22||C12233-2|NOT_FOUND;INVALID_JOURNAL
- virology|1993|193|492|hardy me|Q02945-1|8382410
- virus genes|1992|6|393||P27423-1|1335631
- yeast|1992|8|253|sasnauskas k|P24813-1|1514324

Consumer health

The National Library of Medicine cannot provide specific medical advice. NLM urges you to consult a qualified health care professional for answers to your medical questions. NLM does not have pamphlets or other materials to mail.

MedlinePlus and MedlinePlus en español are specifically designed for consumers, containing hundreds of topic pages including NIH-written descriptive information, videos, health check tools, drug, herb and supplement info, links to Fact Sheets from other NIH Institutes, the CDC, etc., and more.

Appendices

- Further assistance and training
- Search Field descriptions and tags
- How PubMed works: Automatic Term Mapping (ATM)
- Algorithm for finding best matching citations in PubMed
- PubMed coverage
- PubMed format
- NLM author indexing policy
- Error messages
- Cookies
- MeSH Subheadings
- Stopwords
- PubMed character conversions
- Publication Types
- Status Subsets

- [Clinical Queries filters](#)
- [Computation of similar articles](#)
- [Journal lists](#)

Further assistance and training

Contact customer support

- E-mail the [PubMed Help Desk](#)
- Call the NLM Customer service desk: 1-888-FIND-NLM (1-888-346-3656)

Other NLM publications

- [Tutorials](#)
- [Distance Education Resources](#)
- [NLM PubMed Training Manuals](#)
- [NLM Technical Bulletin](#)

Search Field descriptions and tags

- [Affiliation [AD]](#)
- [All Fields [ALL]](#)
- [Article Identifier [AID]](#)
- [Author [AU]](#)
- [Author Identifier [AUID]](#)
- [Book [BOOK]](#)
- [Comment Correction Type](#)
- [Completion Date [DCOM]](#)
- [Conflict of Interest Statement [COIS]](#)
- [Corporate Author [CN]](#)
- [Create Date [CRDT]](#)
- [EC/RN Number [RN]](#)
- [Editor [ED]](#)
- [Entry Date [EDAT]](#)
- [Filter [FILTER] [SB]](#)
- [First Author Name [1AU]](#)
- [Full Author Name [FAU]](#)
- [Full Investigator Name [FIR]](#)
- [Grant Number [GR]](#)
- [Investigator [IR]](#)

- ISBN [ISBN]
- Issue [IP]
- Journal [TA]
- Language [LA]
- Last Author Name [LASTAU]
- Location ID [LID]
- MeSH Date [MHDA]
- MeSH Major Topic [MAJR]
- MeSH Subheadings [SH]
- MeSH Terms [MH]
- Modification Date [LR]
- NLM Unique ID [JID]
- Other Term [OT]
- Owner
- Pagination [PG]
- Personal Name as Subject [PS]
- Pharmacological Action [PA]
- Place of Publication [PL]
- PMCID and MID
- PMID [PMID]
- Publication Date [DP]
- Publication Type [PT]
- Publisher [PUBN]
- Secondary Source ID [SI]
- Subset [SB]
- Supplementary Concept [NM]
- Text Words [TW]
- Title [TI]
- Title/Abstract [TIAB]
- Transliterated Title [TT]
- Volume [VI]

Affiliation [AD]

Affiliation may be included for authors, corporate authors and investigators, e.g., cleveland [ad] AND clinic [ad], if submitted by the publisher. Multiple affiliations were added to citations starting from 2014, previously only the first author's affiliation was included. PubMed includes the note "Contributed equally" in the affiliation field when this information is supplied by publishers.

All Fields [ALL]

Untagged terms and terms tagged with [all fields] are processed using Automatic Term Mapping (ATM). Terms that do not map are searched in all search fields except for Place of Publication, Create Date, Completion Date, Entry Date, MeSH Date, and Modification Date. Terms enclosed in double quotes or truncated will be searched in all fields and not processed using automatic term mapping. PubMed ignores stopwords.

Article Identifier [AID]

Includes article identifiers submitted by journal publishers such as DOI (digital object identifier).

Author [AU]

The format to search for this field is: last name followed by a space and up to the first two initials followed by a space and a suffix abbreviation, if applicable, all without periods or a comma after the last name (e.g., fauci as or o'brien jc jr). Initials and suffixes may be omitted when searching.

PubMed automatically truncates a search for an author's name to account for varying initials, e.g., o'brien j [au] will retrieve o'brien ja, o'brien jb, o'brien jc jr, as well as o'brien j. To turn off automatic truncation, enclose the author's name in double quotes and tag with [au] in brackets, e.g., "o'brien j" [au] to retrieve just o'brien j.

Searching by full author name for articles published from 2002 forward is also possible, if available. See NLM policy on author names.

Author Identifier [AUID]

The author identifier includes a unique identifier associated with an author, corporate or investigator name, if supplied by a publisher. The field includes the organization authority that established the unique identifier, such as, ORCID, ISNI, VIAF, e.g., orcid 0000-0001-5027-4446 [auid].

Book [BOOK]

The book search field includes book citations, e.g., genereviews [book].

Use the following untagged searches to retrieve all book or book chapters, e.g., ataxia AND pmcbookchapter

- books and chapters: pmcbook
- books: pmcbooktitle
- book chapters: pmcbookchapter

Comment Correction Type

The data in these fields are citations to other associated journal publications, e.g., comments or errata. Often these link to the respective citation. Comments/Corrections data can be retrieved by the search term that follows each type:

- Comment in: hascommentin

- Comment on: hascommenton

- Corrected and republished in: hascorrectedrepublishedin

- Corrected and republished from: hascorrectedrepublishedfrom

- Dataset use reported in: hasassociatedpublication

- Dataset described in: hasassociateddataset

- Erratum in: haserratumin

- Erratum for: haserratumfor

- Expression of concern in: hasexpressionofconcernin

- Expression of concern for: hasexpressionofconcernfor

- Original Report in: hasoriginalreportin

- Republished in: hasrepublishedin

- Republished from: hasrepublishedfrom

- Retracted and republished in: hasretractedandrepublishedin

- Retracted and republished from: hasretractedandrepublishedfrom

- Retraction in: hasretractionin

- Retraction of: hasretractionof

- Summary for patients in: hassummaryforpatientsin

- Update in: hasupdatein

- Update of: hasupdateof

Completion Date [DCOM]

Used by NLM for internal processing. Completon Date is not included in All Fields retrieval; the [dcom] search tag is required.

Conflict of Interest Statement [COIS]

The conflict of interest statement from the published article. To retrieve all citations that contain conflict of interest statements, use the query hascois.

Corporate Author [CN]

Corporate author identifies the corporate or collective authorship of an article. Corporate names display exactly as they appear in the journal.

Note: Citations indexed pre-2000 and some citations indexed in 2000-2001 retain corporate authors at the end of the title field. For comprehensive searches, consider including terms and/or words searched in the title field [ti].

Create Date [CRDT]

The date the citation record was first created. Create Date is not included in All Fields retrieval; the [crdt] search tag is required.

EC/RN Number [RN]

EC/RN numbers are assigned by:

- The Food and Drug Administration (FDA) Substance Registration System for Unique Ingredient Identifiers (UNIIs), e.g., Y92OUS2H9B
- The Enzyme Commission (EC) to designate a particular enzyme, e.g., EC 1.1.1.57
- The Chemical Abstracts Service (CAS) for Registry Numbers, e.g., 2751-14-6

  The EC/RN number search field includes both the Registry Number and the Related Registry Number (available in the NLM MeSH Browser).

Editor [ED]

The editor search field includes the editors for book or chapter citations.

Entry Date [EDAT]

Date the citation was added to the PubMed database. Note: Entry Date was called Entrez Date in the legacy PubMed system (retired in 2020).

Exceptions: As of December 15, 2008, citations added to PubMed more than twelve months after the date of publication have the EDAT set to the date of publication, except for book citations. Prior to this, the Entry Date was set to the Publication Date on citations published before September 1997. Entry Date is not included in All Fields retrieval; the [edat] search tag is required.

Search results are displayed in Entry Date for Most Recent sort order, i.e., last in, first out.

To search for a date range, insert a colon (:) between each date, e.g., 1996:1997 [edat] or 1998/01:1998/04 [edat].

See Searching By Date for additional information.

Filter [FILTER] [SB]

Technical tags used by LinkOut, filters include:

- loall[sb] - citations with LinkOut links in PubMed
- free full text[sb] - citations that include a link to a free full-text article
- full text[sb] - citations that include a link to a full-text article

First Author Name [1AU]

The first personal author name in a citation.

Full Author Name [FAU]

The full author name for articles published from 2002 forward, if available. Full author searches can be entered in natural or inverted order, e.g., julia s wong or wong julia s.

Full Investigator Name [FIR]

The index for the article's full investigator or collaborator name, if available. Full investigator searches can be entered in natural or inverted order, e.g., harry janes or janes harry.

Grant Number [GR]

The grant number search field includes research grant numbers, contract numbers, or both that designate financial support by agencies of the US PHS (Public Health Service), and other national or international funding sources. The four parts of the grant data are:

1. number, e.g., LM05545
2. PHS 2-character grant abbreviation, e.g., LM
3. institute acronym, e.g., NLM NIH HHS
4. country, e.g., United States

Each individual grant part can be searched using [gr], e.g., NIH[gr]

See Grant Number Information Found in the GR Field in MEDLINE/PubMed for the 2-character abbreviations, PHS agency acronyms, and other US and non-US funding organizations.

More information about grant numbers:

- NIH grant numbers, e.g., 5R01CA101211-03, typically have three main parts:
o A prefix that indicates the type of grant, e.g., 5R01
o An 8-character serial number consisting of a 2-character grant abbreviation and a 6-digit number, e.g., CA101211
o A suffix with additional data such as grant year, e.g, 03
- To search for an individual NIH grant number use the 8-character serial number and [gr] tag, e.g., ca101211[gr].
- Grant numbers display in PubMed as they appear in the published article. If the grant number in the journal article is not 6 digits, e.g., CA84141, search by inserting a leading zero, e.g., ca084141[gr], so the entire string is a total of 8 characters long.
- For a broader search, use the PHS 2-character grant abbreviation, e.g., ca[gr] or the institute acronym, e.g., nci[gr].
- Search non-PHS organization names in full or individual parts, e.g., wellcome trust[gr], wellcome[gr].
- For generic numbers, it may be necessary to include the organization or country, e.g., 193588[gr] AND canada[gr].

Investigator [IR]

Names of principal investigator(s) or collaborators who contributed to the research. Search names following the author field format, e.g., soller b [ir]

ISBN [ISBN]

The ISBN for book or book chapters.

Issue [IP]

The number of the journal issue in which the article was published.

Journal [TA]

The journal search field includes the journal title abbreviation, full journal title, or ISSN number (e.g., J Biol Chem, Journal of Biological Chemistry, 0021-9258). If a journal title contains special characters, e.g., parentheses, brackets, enter the name without these characters, e.g., enter J Hand Surg [Am] as J Hand Surg Am.

Language [LA]

The language search field includes the language in which the article was published. Note that many non-English articles have English language abstracts. You may search using either the language or the first three characters of most languages, e.g., chi [la] retrieves the same results as chinese [la]. The most notable exception is jpn [la] for Japanese.

Last Author Name [LASTAU]

The last personal author name in a citation.

Location ID [LID]

Location ID includes the DOI or publisher ID that serves the role of pagination to locate an online article.

MeSH Date [MHDA]

The date the citation was indexed with MeSH Terms and elevated to MEDLINE for citations with an Entry Date after March 4, 2000. The MeSH Date is initially set to the Entry Date when the citation is added to PubMed. If the MeSH Date and Entry Date on a citation are the same, and the Entry Date is after March 4, 2000, the citation has not yet been indexed. MeSH Date is not included in All Fields retrieval; the [mhda] search tag is required.

Dates must be entered using the format YYYY/MM/DD [mhda], e.g., 2000/03/15 [mhda]. The month and day are optional (e.g., 2000 [mhda] or 2000/03 [mhda]).

To enter a date range, insert a colon (:) between each date, e.g., 1999:2000 [mhda] or 2000/03:2000/04 [mhda].

MeSH Major Topic [MAJR]

A MeSH term that is one of the main topics discussed in the article denoted by an asterisk on the MeSH term or MeSH/Subheading combination, e.g., Cytokines/physiology* See MeSH Terms [MH] below.

MeSH Subheadings [SH]

MeSH Subheadings are used with MeSH terms to help describe more completely a particular aspect of a subject. For example, the drug therapy of asthma is displayed as asthma/drug therapy; see MeSH/Subheading Combinations in MeSH Terms [MH] below.

The MeSH Subheading field allows users to "free float" Subheadings, e.g., hypertension [mh] AND toxicity [sh].

MeSH Subheadings automatically include the more specific Subheading terms under the term in a search. To turn off this automatic feature, use the search syntax [sh:noexp], e.g., therapy [sh:noexp].

In addition, you can enter the two-letter MeSH Subheading abbreviations rather than spelling out the Subheading, e.g., dh [sh] = diet therapy [sh].

MeSH Terms [MH]

The NLM Medical Subject Headings controlled vocabulary of biomedical terms that is used to describe the subject of each journal article in MEDLINE. MeSH 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. PubMed allows you to view this hierarchy and select terms for searching in the MeSH Database.

Skilled subject analysts examine journal articles and assign to each the most specific MeSH terms applicable - typically ten to twelve. Applying the MeSH vocabulary ensures that articles are uniformly indexed by subject, whatever the author's words.

More information about MeSH Terms and Major MeSH Topic search fields:

- To search the term only as a MeSH term, it must be tagged using the search field, e.g., [mh] for MeSH Terms or [majr] for MeSH Major Topic. A tagged term is checked against the subject translation table, and then mapped to the appropriate MeSH term(s). To turn off mapping to multiple MeSH terms, enter the tagged MeSH term in double quotes.

- MeSH terms are arranged hierarchically by subject categories with more specific terms arranged beneath broader terms. MeSH terms in PubMed automatically include the more specific MeSH terms in a search. To turn off this automatic feature, use the search syntax [mh:noexp], e.g., neoplasms [mh:noexp].For more detailed information about MeSH vocabulary including the hierarchical structure, please see the MeSH homepage.

- MeSH/Subheading Combinations: To directly attach MeSH Subheadings, use the format MeSH Term/Subheading, e.g., neoplasms/diet therapy. You may also use the two-letter MeSH Subheading abbreviations, e.g., neoplasms/dh. The [mh] tag is not required, however [majr] may be used, e.g., plants/genetics[majr]. Only one Subheading may be directly attached to a MeSH term. For a MeSH/Subheading combination, PubMed always includes the more specific terms arranged beneath broader terms for the MeSH term and also includes the more specific terms arranged beneath broader Subheadings. The broader Subheading, or one of its indentions, will be directly attached to the MeSH term or one of its indentions. For example, hypertension/therapy also retrieves hypertension/diet therapy; hypertension/drug therapy; hypertension, malignant/therapy; hypertension, malignant/drug therapy, and so on, as well as hypertension/therapy.

- To turn off the automatic inclusion of the more specific terms, use the syntax [field:noexp], e.g., hypertension [mh:noexp], or hypertension [majr:noexp], or hypertension/therapy [mh:noexp]. The latter example turns off the more specific terms in both parts, searching for only the one Subheading therapy attached directly to only the one MeSH term hypertension.

- If parentheses are embedded in a MeSH term, replace the parentheses with a space and tag with [mh] e.g., enter the MeSH term Benzo(a)pyrene as benzo a pyrene [mh].

- MeSH terms can be selected for searching in the MeSH database and from the advanced search builder index.

Modification Date [LR]

Modification date is a completed citation's most recent revision date. Modification Date is not included in All Fields retrieval; the [lr] search tag is required.

NLM Unique ID [JID]

The NLM ID is the alpha-numeric identifier for the cited journal that was assigned by the NLM Integrated Library System LocatorPlus, e.g., 0375267 [jid].

Other Term [OT]

The author keyword field (OT field) is searchable with the text word [tw] and other term [ot] search tags. To retrieve all citations that have keywords, use the query haskeyword. Other term data may display an asterisk to indicate a major concept; however, you cannot search other terms with a major concept tag.

Owner

The owner search field includes the acronym that identifies the organization that supplied the citation data. Search using owner + the owner acronym, e.g., ownernasa.

Pagination [PG]

Enter only the first page number that the article appears on. The citation will display the full pagination of the article but this field is searchable using only the first page number.

Personal Name as Subject [PS]

Use this search field tag to limit retrieval to where the name is the subject of the article, e.g., varmus h[ps]. Search for personal names as subject using the author field format, e.g., varmus h[ps].

Pharmacological Action [PA]

Substances known to have a particular pharmacologic action. Each pharmacologic action term index is created with the drug/substance terms known to have that effect. This includes both MeSH terms and terms for Supplementary Concept Records.

Place of Publication [PL]

Indicates the cited journal's country of publication. Geographic place of publication regions are not searchable. In order to retrieve records for all countries in a region (e.g., North America) it is necessary to OR together the countries of interest. Note: This field is not included in all fields or text word retrieval.

PMCID and MID

Search for PMC or NIH manuscript identifiers using the appropriate prefix followed by the ID number, e.g., PMC2600426. To retrieve all NIH manuscript citations, use the query hasnihmsid.

PMID [PMID]

To search for a PubMed Identifier (PMID), enter the ID with or without the search field tag [pmid]. You can search for several PMIDs by entering each number in the search box separated by a space (e.g., 17170002 16381840); PubMed will OR the PMIDs together.

To search in combination with other terms, you must enter the search field tag, e.g., lipman[au] 16381840[pmid].

PMIDs do not change over time or during processing and are never reused.

Publication Date [DP]

Publication date is the date that the article was published.

Dates or date ranges must be searched using the format yyyy/mm/dd [dp], e.g., 1998/03/06 [dp]. The month and day are optional (e.g., 1998 [dp] or 1998/03 [dp]).

To enter a date range search, insert a colon (:) between each date, e.g., 1996:1998 [dp] or 1998/01:1998/04 [dp].

Use the following format to search X days, months or years immediately preceding today's date where X = numeric value:

- "last X days"[dp]
- "last X months"[dp]
- "last X year"[dp]

More information about publication dates:

- Journals vary in the way the publication date appears on an issue. Some journals include just the year, whereas others include the year plus month or year plus month plus day. And, some journals use the year and season (e.g., Winter 1997). The publication date in the citation is recorded as it appears in the journal.

- Publication dates without a month are set to January, multiple months (e.g., Oct-Dec) are set to the first month, and dates without a day are set to the first day of the month. Dates with a season are set as: winter = January, spring = April, summer = July and fall = October.

- If an article is published electronically and in print on different dates both dates are searchable and may be included on the citation prefaced with an Epub or Print label. The electronic date will not be searchable if it is later than the print date, except when range searching.

- To search for electronic dates only use the search tag [EPDAT], for print dates only tag with [PPDAT].

- Most journals now publish articles online on a continuous basis, as soon as they are ready for publication (after peer review and editing, etc.) instead of, or in addition to, publishing collections of articles as an "issue" on a periodic basis. When a journal deposits a citation for an "online first" article in PubMed, NLM appends the note "[Epub ahead of print]" to the online publication date. The citation is updated, and the ahead of print notation removed, when the article is included in a journal issue. The lag between the "online first" and "issue" publication dates may be days, weeks, months, or more than a year. In many cases, depending on the journal, the online first version is considered to be the version of record. The "[Epub ahead of print]" note in PubMed should not be taken to mean that the cited article is not the version of record.

- Bookshelf citation publication dates are generated from the book's publication date.

Publication Type [PT]

Describes the type of material the article represents (e.g., Review, Clinical Trial, Retracted Publication, Letter); see the PubMed Publication Types, e.g., review[pt]. Publication Types are arranged hierarchically with more specific terms arranged beneath broader terms. Publication types automatically include the more specific publication types in a search. To turn off this automatic feature, use the search syntax [pt:noexp], e.g., review [pt:noexp].

Publisher [PUBN]

Includes publisher names for Bookshelf citations.

Secondary Source ID [SI]

The SI field identifies secondary source databanks and accession numbers, e.g., GenBank, GEO, PubChem, ClinicalTrials.gov, ISRCTN. The field is composed of the source followed by a slash followed by an accession number and can be searched with one or both components, e.g., genbank [si], AF001892 [si], genbank/AF001892 [si]. To retrieve all citations with an SI value, search hasdatabanklist.

Subset [SB]

The subset field is a method of restricting retrieval by subject, citation status and journal category, with the search tag [SB]. See also filters and Find related resources using LinkOut.

Supplementary Concept [NM]

Includes chemical, protocol, disease or organism terms. Synonyms to the supplementary concepts will automatically map when tagged with [nm]. This field was implemented in mid-1980; however, many chemical names are searchable as MeSH terms before that date.

Text Words [TW]

Includes all words and numbers in the title, abstract, other abstract, MeSH terms, MeSH Subheadings, Publication Types, Substance Names, Personal Name as Subject, Corporate Author, Secondary Source, Comment/Correction Notes, and Other Terms (see Other Term [OT]

above) typically non-MeSH subject terms (keywords), including NASA Space Flight Mission, assigned by an organization other than NLM.

Title [TI]

Words and numbers included in the title of a citation, as well as the collection title for book citations.

Title/Abstract [TIAB]

Words and numbers included in a citation's title, collection title, abstract, other abstract and keywords. English language abstracts are taken directly from the published article. If an article does not have a published abstract, NLM does not create one.

Transliterated Title [TT]

Words and numbers in title originally published in a non-English language, in that language. Non-Roman alphabet language titles are transliterated. Transliterated title is not included in Text Word [TW] retrieval.

Volume [VI]

The number of the journal volume in which an article is published.

How PubMed works: Automatic Term Mapping (ATM)

Untagged terms that are entered in the search box are matched (in this order) against a Subject translation table (including MeSH (Medical Subject Headings) , a Journals translation table, the Author index, and an Investigator (Collaborator) index.

When a match is found for a term or phrase in a translation table the mapping process is complete and does not continue on to the next translation table.

To see how your terms were translated, check the Search Details available on the Advanced Search page for each query under History. If you want to report a translation that does not seem accurate for your search topic, please e-mail the information to the NLM Help Desk.

1. Subject translation table

The Subject Translation Table contains:

- British and American spellings
- Pairs: singular and plural word forms, synonyms, and other closely related terms
- Drug brand name to generic name translations
- MeSH terms
- The See-Reference mappings (also known as entry terms) for MeSH terms
- MeSH Subheadings
- Publication Types

- [Pharmacologic action](#) terms
- Terms derived from the [Unified Medical Language System (UMLS)](#) that have equivalent synonyms or lexical variants in English
- Supplementary concept (substance) names and their synonyms.

  If a match is found in this translation table, the term will be searched as MeSH (that includes the MeSH term and any specific terms indented under that term in the MeSH hierarchy), and in all fields.

  For example, if you enter child rearing in the search box, PubMed will translate this search to: "child rearing"[MeSH Terms] OR ("child"[All Fields] AND "rearing"[All Fields]) OR "child rearing"[All Fields]

  If you enter a MeSH Term that is also a Pharmacologic Action PubMed will search the term as [MeSH Terms], [Pharmacologic Action], and [All Fields].

  If you enter an entry term for a MeSH term the translation will also include an all fields search for the MeSH term associated with the entry term. For example, a search for odontalgia will translate to: "toothache"[MeSH Terms] OR "toothache"[All Fields] OR "odontalgia"[All Fields] OR "odontalgias"[All Fields] because Odontalgia is an entry term for the MeSH term toothache.

  Substance name mappings do not include a mapping for individual terms in a phrase, e.g., IL-22 will not include IL[All Fields AND 22[All Fields].

  MeSH term mappings that include a standalone number or single character do not include a mapping for individual terms in a phrase, e.g., Protein C will not include Protein[All Fields] or C[All Fields].

2. Journals translation table

The Journals translation table contains the:

- full journal title
- title abbreviation
- ISSN number.

  These will automatically map to the journal abbreviation that is used to search journals in PubMed and in all fields. For example, a search for endocrine pathology will translate to: "Endocr Pathol"[Journal] OR ("endocrine"[All Fields] AND "pathology"[All Fields]) OR "endocrine pathology"[All Fields]

3. Author index

If the term is not found in the above tables, and is not a single term, PubMed checks the author index for a match. The author index includes author names and initials, as well as full author names for articles published from 2002 forward, if available.

More information about author searching:

- PubMed automatically truncates a search for an author's name to account for varying initials, e.g., o'brien j retrieves o'brien ja, o'brien jb, o'brien jc jr, as well as o'brien j.

- When combining multiple authors, to avoid a match with full author names, include initials or use the [au] search tag, e.g., ryan[au] james[au]. Author names comprised of only stopwords, e.g., as a, are not searched as authors if they are part of phrase, chemical burn as a danger, unless the search only includes the author name, e.g., as a.

- Enter a full author name in natural or inverted order, e.g., julia s wong or wong julia s.

- A comma following the last name for searching is optional. For some names, however, it is necessary to distinguish which name is the last name by using the comma following the last name, e.g., james, ryan.

- Omit periods after initials and put all suffixes at the end, e.g., vollmer charles jr

- Initials and suffixes are not required, if you include a middle initial or suffix, you will only retrieve citations for articles that were published using the middle initial or suffix.

- To distinguish author initials that may match a full author name use the [fau] search tag, e.g., peterson do[fau].

4. Investigator (Collaborator) index

If the term is not found in the above tables, except for Author, and is not a single term, the investigator index is consulted for a match. The investigator (collaborator) index includes full names, if available. Enter a full investigator name in natural or inverted order, e.g., harry janes or janes harry.

5. If no match is found?

PubMed breaks apart the phrase and repeats the above automatic term mapping process until a match is found. PubMed ignores stopwords in searches.

If there is no match, the individual terms will be combined (ANDed) together and searched in all fields.

When a search includes terms that were tagged with a search field during the automatic term mapping process and retrieves zero results, the system triggers a subsequent search using "Schema: all ." "Schema: all" modifies the search by removing the automatically added search field tags, and then searches each term in all fields.

Algorithm for finding best matching citations in PubMed

The learned ranking algorithm combines over 150 signals that are helpful for finding best matching results. Most of these signals are computed from the query-document term pairs (e.g., number of term matches between the query and the document) while others are either specific to a document (e.g., publication type; publication year) or query (e.g., query length). The new ranking model was built on relevance data extracted from the anonymous and aggregated PubMed search logs over an extended period of time.

For more information about the Best Match algorithm, please see:

- Technical details in the paper Best Match: New relevance search for PubMed by Fiorini N, Canese K, Starchenko G, et al. in PLoS Biol (2018).

- NLM Technical Bulletin article: Updated Algorithm for the PubMed Best Match Sort Order

PubMed coverage

PubMed provides access to bibliographic information that includes MEDLINE, as well as:

- The out-of-scope citations (e.g., articles on plate tectonics or astrophysics) from certain MEDLINE journals, primarily general science and chemistry journals, for which the life sciences articles are indexed for MEDLINE.
- Citations that precede the date that a journal was selected for MEDLINE indexing.
- Some additional life science journals that submit full text to PubMed Central and receive a qualitative review by NLM.
- Citations for the NCBI Bookshelf collection.

  For additional information, please see the NLM Fact Sheet: Medline, PubMed, and PMC (PubMed Central): How are they different?

MEDLINE

MEDLINE is the NLM premier bibliographic database that contains references to journal articles in the life sciences with a concentration on biomedicine. MEDLINE records are indexed with NLM Medical Subject Headings (MeSH). The database contains citations from the late 1940s to the present , with some older material. New citations that have been indexed with MeSH terms, publication types, GenBank accession numbers, and other indexing data are available daily. To limit your search to MEDLINE citations, add medline[sb] to your search.

Publisher-supplied citations

Citations are received electronically from publishers and appear in PubMed daily. Most citations progress to in-process, and then to indexed for MEDLINE. However, not all citations will be indexed for MEDLINE. Publishers may submit citations for articles that appear on the web in advance of the journal issue's release. These ahead-of-print citations display the tag [Online ahead of print].

PubMed format

The PubMed Format tags table defines the data tags that compose the PubMed format. The tags are presented in alphabetical order. Some of the tags (e.g., CIN) are not mandatory and therefore will not be found in every record. Other tags (e.g., AU, MH, and RN) may occur multiple times in one record. You can download records in PubMed format as a text file (.txt) or as an .nbib file for exporting into citation management software programs.

Note: Not all fields are searchable in PubMed. See: Search Field Descriptions and Tags.

PubMed Format tags		
Tag	Name	Description
AB	Abstract	English language abstract taken directly from the published article
AD	Affiliation	Author or corporate author addresses

AID	Article Identifier	Article ID values supplied by the publisher may include the pii (controlled publisher identifier), doi (digital object identifier), or book accession
AU	Author	Authors
BTI	Book Title	Book Title
CI	Copyright Information	Copyright statement provided by the publisher
CIN	Comment In	Reference containing a comment about the article
CN	Corporate Author	Corporate author or group names with authorship responsibility
COI	Conflict of Interest	Conflict of interest statement
CON	Comment On	Reference upon which the article comments
CP	Chapter	Book chapter
CRDT	Create Date	The date the citation record was first created
CRF	Corrected and republished from	Final, correct version of an article
CRI	Corrected and republished in	Original article that was republished in corrected form
CTDT	Contribution Date	Book contribution date
CTI	Collection Title	Collection Title
DCOM	Completion Date	NLM internal processing completion date
DDIN	Dataset described in	Citation for the primary article resulting from a dataset
DRIN	Dataset use reported in	Citation for an article that uses a dataset from another scientific article
DEP	Date of Electronic Publication	Electronic publication date
DP	Publication Date	The date the article was published
DRDT	Date Revised	Book Revision Date
ECF	Expression of Concern For	Reference containing an expression of concern for an article
ECI	Expression of Concern In	Cites the original article for which there is an expression of concern
EDAT	Entrez Date	The date the citation was added to PubMed; the date is set to the publication date if added more than 1 year after the date published

EFR	Erratum For	Cites the original article needing the correction
EIN	Erratum In	Reference containing a published erratum to the article
ED	Editor	Book editors
EN	Edition	Book edition
FAU	Full Author Name	Full Author Names
FED	Full Editor Name	Full Editor Names
FIR	Full Investigator	Full investigator or collaborator name
FPS	Full Personal Name as Subject	Full Personal Name of the subject of the article
GN	General Note	Supplemental or descriptive information related to the document
GR	Grant Number	Research grant numbers, contract numbers, or both that designate financial support by any agency of the US PHS or other funding agencies
GS	Gene Symbol	Abbreviated gene names (used 1991 through 1996)
IP	Issue	The number of the issue, part, or supplement of the journal in which the article was published
IR	Investigator	Investigator or collaborator
IRAD	Investigator Affiliation	Investigator or collaborator addresses
IS	ISSN	International Standard Serial Number of the journal
ISBN	ISBN	International Standard Book Number
JID	NLM Unique ID	Unique journal ID in the NLM catalog of books, journals, and audiovisuals
JT	Full Journal Title	Full journal title from NLM cataloging data
LA	Language	The language in which the article was published
LID	Location ID	The pii or doi that serves the role of pagination
LR	Modification Date	Citation last revision date
MH	MeSH Terms	NLM Medical Subject Headings (MeSH) controlled vocabulary
MHDA	MeSH Date	The date MeSH terms were added to the citation. The MeSH date is the same as the Entrez date until MeSH are added
OAB	Other Abstract	Abstract supplied by an NLM collaborating organization
OABL	Other Abstract Language	Language of an abstract available from the publisher

OCI	Other Copyright Information	Copyright owner
OID	Other ID	Identification numbers provided by organizations supplying citation data
ORI	Original Report In	Cites the original article associated with the patient summary
OT	Other Term	Non-MeSH subject terms (keywords) either assigned by an organization identified by the Other Term Owner, or generated by the author and submitted by the publisher
OTO	Other Term Owner	Organization that may have provided the Other Term data
OWN	Owner	Organization acronym that supplied citation data
PB	Publisher	Publishers of Books & Documents citations
PG	Pagination	The full pagination of the article
PHST	Publication History Status Date	Publisher supplied dates regarding the article publishing process
PL	Place of Publication	Journal's (country only) or book's place of publication
PMCR	PMC Release	Availability of PMC article
PMID	PubMed Unique Identifier	Unique number assigned to each PubMed citation
PRIN	Partial Retraction In	Partial retraction of the article
PROF	Partial Retraction Of	Article being partially retracted
PS	Personal Name as Subject	Individual is the subject of the article
PST	Publication Status	Publication status
PT	Publication Type	The type of material the article represents
RF	Number of References	Number of bibliographic references for Review articles
RIN	Retraction In	Retraction of the article
RN	EC/RN Number	Includes chemical, protocol or disease terms. May also a number assigned by the Enzyme Commission or by the Chemical Abstracts Service.
ROF	Retraction Of	Article being retracted
RPF	Republished From	Article being cited has been republished or reprinted in either full or abridged form from another source
RPI	Republished In	Article being cited also appears in another source in either full or abridged form

RRI	Retracted and Republished In	Final, republished version of an article
RRF	Retracted and Republished From	Original article that was retracted and republished
SB	Subset	Journal or citation subset values representing specialized topics
SFM	Space Flight Mission	NASA-supplied data space flight/mission name and/or number
SI	Secondary Source Identifier	Identifies secondary source databanks and accession numbers of molecular sequences discussed in articles
SO	Source	Composite field containing bibliographic information
SPIN	Summary For Patients In	Cites a patient summary article
STAT	Status Tag	Used for internal processing at NLM
TA	Journal Title Abbreviation	Standard journal title abbreviation
TI	Title	The title of the article
TT	Transliterated Title	Title of the article originally published in a non-English language, in that language
UIN	Update In	Update to the article
UOF	Update Of	The article being updated
VI	Volume	Volume number of the journal
VTI	Volume Title	Book Volume Title

NLM author indexing policy

NLM author indexing policy is as follows:

- 1966 - 1984: MEDLINE did not limit the number of authors.
- 1984 - 1995: The NLM limited the number of authors to 10, with "et al" as the eleventh occurrence.
- 1996 - 1999: The NLM increased the limit from 10 to 25. If there were more than 25 authors, the first 24 were listed, the last author was used as the 25th, and the twenty-sixth and beyond became "et al."
- 2000 - Present: MEDLINE does not limit the number of authors.

More information:

- Beginning in mid-2005, the policy restrictions on number of author names in past years were lifted so that on an individual basis, a citation may be edited to include all author names in the published article, regardless of the limitation in effect when the citation was created.

- Effective with 1992 date of publication, letters are indexed individually with authors rather than as an anonymous group.

- Until 1990, NLM transliterated up to five authors' Cyrillic or Japanese names to the Roman alphabet.

- Between 1990 and 2016, the first ten Cyrillic or Japanese names are transliterated. Chinese ideograms were not transliterated by NLM, but if transliterations of the authors names are available in the journal article or table of contents, they were included in the citation, even if that includes only one author in a multi-author article.

- Beginning in 2016, author names are published in Roman characters in all MEDLINE journals, and NLM no longer transliterates Cyrillic or Japanese names. All author names are included as published.

Error messages

System error messages

Please provide your IT staff with the technical browser advice for NCBI web pages to ensure your browser, firewall, and servers are enabled for JavaScript, cookies, pop-ups, and HTTP 1.1. Antivirus software may affect page caching which can result in unexpected page expired messages. Also, nlm.nih.gov should be added as a browser exception and be considered a trusted site by your system and network. You may have to delete your browser's cache (temporary files) before trying to access PubMed again.

Typographical errors

Please contact the journal publisher directly to report an error and initiate a correction to PubMed citations for content other than MeSH.

To report a MeSH error in a PubMed citation, please contact the NLM Help Desk and include the PMID number (e.g., PMID: 12345678), and an indication of the incorrect and correct information.

NLM provides data to vendors around the world. Other products and services will not necessarily immediately reflect corrections made to PubMed records. If you search through a vendor's system, please contact your vendor about their maintenance schedules.

Cookies

A "cookie" is information stored by a web site server on your computer. See the NLM Privacy Policy for additional information.

In the case of PubMed, cookies store information about your interactions that may be needed later to perform a function. To use these interactive features you need to enable cookies on your computer. Consult your browser's help for information on enabling cookies.

If you have problems using cookie-dependent features of PubMed, even after enabling cookies, possible reasons may include:

- Cookies are blocked by your provider or institution. Check with your Internet provider and/or the system administrator at your institution to see if cookies can be accepted. Even if you have them enabled in your web browser, if they are blocked by your provider or institution (e.g., by a firewall, proxy server, etc.), cookie-dependent features of PubMed won't work.
- Your computer's date and time settings are incorrect. Check your computer's time settings to ensure that they are correct.

MeSH Subheadings

See the MeSH Subheadings table below and scope notes and allowable categories on the NLM website.

Abbreviation	MeSH Subheading	Abbreviation	MeSH Subheading
AB	Abnormalities	IR	Innervation
AD	Administration and Dosage	IS	Instrumentation
AE	Adverse Effects	IP	Isolation and Purification
AG	Agonists	LJ	Legislation and Jurisprudence
AA	Analogs and Derivatives	ME	Metabolism
AN	Analysis	MT	Methods
AH	Anatomy and Histology	MI	Microbiology
AI	Antagonists and Inhibitors	MO	Mortality
BI	Biosynthesis	NU	Nursing
BS	Blood Supply	OG	Organization and Administration
BL	Blood	PS	Parasitology
CF	Cerebrospinal Fluid	PY	Pathogenicity
CS	Chemical Synthesis	PA	Pathology
CI	Chemically Induced	PK	Pharmacokinetics
CH	Chemistry	PD	Pharmacology
CL	Classification	PH	Physiology
CO	Complications	PP	Physiopathology
CN	Congenital	PO	Poisoning
CY	Cytology	PC	Prevention and Control
DF	Deficiency	PX	Psychology
DI	Diagnosis	RE	Radiation Effects

DH	Diet Therapy	RT	Radiotherapy
DG	Diagnostic Imaging	RH	Rehabilitation
DE	Drug Effects	SC	Secondary
DT	Drug Therapy	ST	Standards
EC	Economics	SN	Statistics and Numerical Data
ED	Education	SD	Supply and Distribution
EM	Embryology	SU	Surgery
EN	Enzymology	TU	Therapeutic Use
EP	Epidemiology	TH	Therapy
ES	Ethics	TO	Toxicity
EH	Ethnology	TM	Transmission
ET	Etiology	TR	Transplantation
GE	Genetics	TD	Trends
GD	Growth and Development	UL	Ultrastructure
HI	History	UR	Urine
IM	Immunology	VE	Veterinary
IN	Injuries	VI	Virology

Stopwords

	Stopwords
A	a, about, again, all, almost, also, although, always, among, an, and, another, any, are, as, at
B	be, because, been, before, being, between, both, but, by
C	can, could
D	did, do, does, done, due, during
E	each, either, enough, especially, etc
F	for, found, from, further
H	had, has, have, having, here, how, however
I	i, if, in, into, is, it, its, itself
J	just

K	kg, km
M	made, mainly, make, may, mg, might, ml, mm, most, mostly, must
N	nearly, neither, no, nor
O	obtained, of, often, on, our, overall
P	perhaps, pmid
Q	quite
R	rather, really, regarding
S	seem, seen, several, should, show, showed, shown, shows, significantly, since, so, some, such
T	than, that, the, their, theirs, them, then, there, therefore, these, they, this, those, through, thus, to
U	upon
V	various, very
W	was, we, were, what, when, which, while, with, within, without, would

PubMed character conversions

Certain characters have special meaning in searches, others are converted to spaces.

Searches that include the following characters are translated as follows:

- parentheses ( ) - used to create Boolean nesting
- square brackets [ ] - search field tag qualification
- ampersand & - Boolean operator AND
- pipe | - Boolean operator OR
- forward slash / - MeSH/Subheading combinations
- colon : - designates a range operation
- double quotes " - used to force a phrase search
- pound sign # - designates a History search statement when immediately followed by a number, e.g., #1 AND cat
- asterisk * - wildcard symbol for search term truncation, e.g., toxicol*

Characters converted to spaces in search queries:

- exclamation mark !
- pound sign #
- dollar sign $
- percentage sign %
- asterisk * (if it cannot be used in a wildcard search, for example, when a term is too short)

- plus symbol +
- minus symbol -
- period .
- comma ,
- semi-colon ;
- angle brackets < >
- equal sign =
- question mark ?
- backslash \
- caret ^
- underscore _
- curly brackets { }
- approximately ~
- single quotes '

Some characters have special meaning in MeSH fields:

- forward slash /
- hypens -
- comma ,

Publication Types

See the complete list of Publication Types. Publication types found in PubMed are listed below.

- Adaptive Clinical Trial
- Address
- Autobiography
- Bibliography
- Biography
- Case Reports
- Classical Article
- Clinical Conference
- Clinical Study
- Clinical Trial
- Clinical Trial, Phase I
- Clinical Trial, Phase II
- Clinical Trial, Phase III
- Clinical Trial, Phase IV

- Clinical Trial Protocol
- Clinical Trial, Veterinary
- Collected Works
- Comparative Study
- Congress
- Consensus Development Conference
- Consensus Development Conference, NIH
- Controlled Clinical Trial
- Dataset
- Dictionary
- Directory
- Duplicate Publication
- Editorial
- Electronic Supplementary Materials
- English Abstract
- Equivalence Trial
- Evaluation Study
- Expression of Concern
- Festschrift
- Government Publication
- Guideline
- Historical Article
- Interactive Tutorial
- Interview
- Introductory Journal Article
- Journal Article
- Lecture
- Legal Case
- Legislation
- Letter
- Meta-Analysis
- Multicenter Study
- News
- Newspaper Article
- Observational Study
- Observational Study, Veterinary

- Overall

- Patient Education Handout

- Periodical Index

- Personal Narrative

- Portrait

- Practice Guideline

- Pragmatic Clinical Trial

- Publication Components

- Publication Formats

- Publication Type Category

- Randomized Controlled Trial

- Research Support, American Recovery and Reinvestment Act

- Research Support, N.I.H., Extramural

- Research Support, N.I.H., Intramural

- Research Support, Non-U.S. Gov't Research Support, U.S. Gov't, Non-P.H.S.

- Research Support, U.S. Gov't, P.H.S.

- Review

- Scientific Integrity Review

- Study Characteristics

- Support of Research

- Systematic Review

- Technical Report

- Twin Study

- Validation Study

- Video-Audio Media

- Webcast

Status Subsets

How to Search	Citation Status
publisher[sb] NOT pubstatusnihms NOT pubstatuspmcsd NOT pmcbook	Citations recently added to PubMed via electronic submission from a publisher, and are soon to proceed to the next stage, PubMed - in process (see below). Also for citations received before late 2003 if they are from journals not indexed for MEDLINE, or from a journal that was accepted for MEDLINE after the citations' publication date. These citations bibliographic data have not been reviewed.
inprocess[sb]	MeSH terms will be assigned if the subject of the article is within the scope of MEDLINE.

medline[sb]	Citations that have been indexed with MeSH terms, Publication Types, Substance Names, etc.
pubstatusnihms AND publisher[sb]	Author manuscripts submitted to PMC that fall under the NIH Public Access Policy.
pubstatuspmcsd AND publisher[sb]	Records for selective deposit articles in PMC. These are articles published in non-MEDLINE journals where the publisher has chosen to deposit in PMC only those articles that fall under the NIH Public Access Policy.
pmcbook	Book and book chapter citations available on the NCBI Bookshelf.
pubmednotmedline[sb]	Citations that will not receive MEDLINE indexing because they are for articles in non-MEDLINE journals, or they are for articles in MEDLINE journals but the articles are out of scope, or they are from issues published prior to the date the journal was selected for indexing, or citations to articles from journals that deposit their full text articles in PMC but have not yet been recommended for indexing in MEDLINE.

Clinical Queries filters

[Systematic reviews search filter](#)

Clinical Queries using research methodology filters

The Clinical Queries search filters are based on the work of [Haynes RB et al.](#)

Category	Optimized For	Sensitive/ Specific	PubMed Equivalent
therapy	sensitive/broad	99%/70%	((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials as topic[MeSH Terms] OR clinical trial[Publication Type] OR random*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading])
	specific/narrow	93%/97%	(randomized controlled trial[Publication Type] OR (randomized[Title/Abstract] AND controlled[Title/Abstract] AND trial[Title/Abstract]))
diagnosis	sensitive/broad	98%/74%	(sensitiv*[Title/Abstract] OR sensitivity and specificity[MeSH Terms] OR diagnose[Title/Abstract] OR diagnosed[Title/Abstract] OR diagnoses[Title/Abstract] OR diagnosing[Title/Abstract] OR diagnosis[Title/Abstract] OR diagnostic[Title/Abstract] OR diagnosis[MeSH:noexp] OR diagnostic * [MeSH:noexp] OR diagnosis,differential[MeSH:noexp] OR diagnosis[Subheading:noexp])
	specific/narrow	64%/98%	(specificity[Title/Abstract])

etiology	sensitive/broad	93%/63%	(risk*[Title/Abstract] OR risk*[MeSH:noexp] OR risk *[MeSH:noexp] OR cohort studies[MeSH Terms] OR group[Text Word] OR groups[Text Word] OR grouped [Text Word])
	specific/narrow	51%/95%	((relative[Title/Abstract] AND risk*[Title/Abstract]) OR (relative risk[Text Word]) OR risks[Text Word] OR cohort studies[MeSH:noexp] OR (cohort[Title/Abstract] AND study[Title/Abstract]) OR (cohort[Title/Abstract] AND studies[Title/Abstract]))
prognosis	sensitive/broad	90%/80%	(incidence[MeSH:noexp] OR mortality[MeSH Terms] OR follow up studies[MeSH:noexp] OR prognos*[Text Word] OR predict*[Text Word] OR course*[Text Word])
	specific/narrow	52%/94%	(prognos*[Title/Abstract] OR (first[Title/Abstract] AND episode[Title/Abstract]) OR cohort[Title/Abstract])
clinical prediction guides	sensitive/broad	96%/79%	(predict*[tiab] OR predictive value of tests[mh] OR score[tiab] OR scores[tiab] OR scoring system[tiab] OR scoring systems[tiab] OR observ*[tiab] OR observer variation[mh])
	specific/narrow	54%/99%	(validation[tiab] OR validate[tiab])

Medical genetics search filters

The genetics searches were developed in conjunction with the staff of GeneReviews: Genetic Disease Online Reviews at GeneTests, University of Washington, Seattle.

Category	PubMed Equivalent
Diagnosis	(Diagnosis AND Genetics)
Differential Diagnosis	(Differential Diagnosis[MeSH] OR Differential Diagnosis[Text Word] AND Genetics)
Clinical Description	(Natural History OR Mortality OR Phenotype OR Prevalence OR Penetrance AND Genetics)
Management	(therapy[Subheading] OR treatment[Text Word] OR treatment outcome OR investigational therapies AND Genetics)
Genetic Counseling	(Genetic Counseling OR Inheritance pattern AND genetics)
Molecular Genetics	(Medical Genetics OR genotype OR genetics[Subheading] AND genetics)
Genetic Testing	(DNA Mutational Analysis OR Laboratory techniques and procedures OR Genetic Markers OR diagnosis OR testing OR test OR screening OR mutagenicity tests OR genetic techniques OR molecular diagnostic techniques AND genetics)

All	((Diagnosis AND genetics) OR (Differential Diagnosis[MeSH] OR Differential Diagnosis[Text Word] AND genetics) OR (Natural History OR Mortality OR Phenotype OR Prevalence OR Penetrance AND genetics) OR (therapy[Subheading] OR treatment[Text Word] OR treatment outcome OR investigational therapies AND genetics) OR (Genetic Counseling OR Inheritance pattern AND genetics) OR (Medical Genetics OR genotype OR genetics[Subheading] AND genetics) OR (DNA Mutational Analysis OR Laboratory techniques and procedures OR Genetic Markers OR diagnosis OR testing OR test OR screening OR mutagenicity tests OR genetic techniques OR molecular diagnostic techniques AND genetics))	

Computation of similar articles

The neighbors of a document are those documents in the database that are the most similar to it. The similarity between documents is measured by the words they have in common, with some adjustment for document lengths. To carry out such a program, one must first define what a word is. For us, a word is basically an unbroken string of letters and numerals with at least one letter of the alphabet in it. Words end at hyphens, spaces, new lines, and punctuation. The 132 common, but uninformative, words (also known as stopwords) are eliminated from processing at this stage. Next, a limited amount of stemming of words is done, but no thesaurus is used in processing. Words from the abstract of a document are classified as text words. Words from titles are also classified as text words, but words from titles are added in a second time to give them a small advantage in the local weighting scheme. MeSH terms are placed in a third category, and a MeSH term with a subheading qualifier is entered twice, once without the qualifier and once with it. If a MeSH term is starred (indicating a major concept in a document), the star is ignored. These three categories of words (or phrases in the case of MeSH) comprise the representation of a document. No other fields, such as Author or Journal, enter into the calculations.

Having obtained the set of terms that represent each document, the next step is to recognize that not all words are of equal value. Each time a word is used, it is assigned a numerical weight. This numerical weight is based on information that the computer can obtain by automatic processing. Automatic processing is important because the number of different terms that have to be assigned weights is close to two million for this system. The weight or value of a term is dependent on three types of information: 1) the number of different documents in the database that contain the term; 2) the number of times the term occurs in a particular document; and 3) the number of term occurrences in the document. The first of these pieces of information is used to produce a number called the global weight of the term. The global weight is used in weighting the term throughout the database. The second and third pieces of information pertain only to a particular document and are used to produce a number called the local weight of the term in that specific document. When a word occurs in two documents, its weight is computed as the product of the global weight times the two local weights (one pertaining to each of the documents).

The global weight of a term is greater for the less frequent terms. This is reasonable because the presence of a term that occurred in most of the documents would really tell one very little about a document. On the other hand, a term that occurred in only 100 documents of one million would be very helpful in limiting the set of documents of interest. A word that occurred in only 10 documents is likely to be even more informative and will receive an even higher weight.

The local weight of a term is the measure of its importance in a particular document. Generally, the more frequent a term is within a document, the more important it is in representing the content of that document. However, this relationship is saturating, i.e., as the frequency continues to go up, the importance of the word increases less rapidly and finally comes to a finite

limit. In addition, we do not want a longer document to be considered more important just because it is longer; therefore, a length correction is applied. This local weight computation is based on the Poisson distribution and the formula can be found in Lin J and Wilbur WJ.

The similarity between two documents is computed by adding up the weights (local wt1 × local wt2 × global wt) of all of the terms the two documents have in common. This provides an indication of how related two documents are. The resultant score is an example of a vector score. Vector scoring was originated by Gerard Salton and has a long history in text retrieval. The interested reader is referred to Salton, Automatic Text Processing, Reading, MA: Addison-Wesley, 1989 for further information on this topic. Our approach differs from other approaches in the way we calculate the local weights for the individual terms. Once the similarity score of a document in relation to each of the other documents in the database has been computed, that document's neighbors are identified as the most similar (highest scoring) documents found. These closely related documents are pre-computed for each document in PubMed so that when you select Similar articles, the system has only to retrieve this list. This enables a fast response time for such queries.

Journal lists

PubMed journals

- Uncompressed
- GNU zip
- UNIX Compress
- PKZIP

PubMed and NCBI molecular biology database journals

- Uncompressed
- GNU zip
- UNIX Compress
- PKZIP