# PubMed Help

Last Updated: June 29, 2023

National Center for Biotechnology Information (US)
Bethesda (MD)

National Center for Biotechnology Information (US), Bethesda (MD)

NLM Citation: PubMed Help [Internet]. Bethesda (MD): National Center for Biotechnology Information (US); 2005-.

This book contains information on PubMed, a service of the National Center for Biotechnology Information (NCBI) that includes millions of citations from MEDLINE and other life science journals for biomedical articles. PubMed includes links to full text articles and other related resources.

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# PubMed Help

Updated: March 31, 2020.

Tutorials

PubMed comprises over 30 million citations for biomedical literature from MEDLINE, life science journals, and online books. PubMed citations and abstracts include the fields of biomedicine and health, covering portions of the life sciences, behavioral sciences, chemical sciences, and bioengineering. PubMed also provides access to additional relevant web sites and links to the other NCBI molecular biology resources.

PubMed is a free resource that is developed and maintained by the National Center for Biotechnology Information (NCBI), at the U.S. National Library of Medicine (NLM), located at the National Institutes of Health (NIH).

Publishers of journals can submit their citations to NCBI and then provide access to the full-text of articles at journal web sites using LinkOut.

For a brief overview of searching PubMed, see the Quick Start section.

## FAQs

- How can I get the full-text article? Tutorial
- How do I find consumer health information about a disease or condition?
- How can I export citations to my citation management software program?
- How do I create a link to PubMed?
- What can I do about system error messages or typographical errors?
- Why is the link to the full-text not working?
- How can I save my search and receive an automatic email update?
- How can I download PubMed?

## PubMed Quick Start

**Section Contents**

- How do I search PubMed? Quick Tour
- How do I search by author? Quick Tour
- 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 the year the article was published.
- Is there anything special for clinical searches?
- How do I find systematic reviews?
- How do I search for medical genetics information?
- Can you explain the search results?
- How do I display an abstract?
- How can I get a copy of the article?
- How can I save my results?
- I retrieved too many citations. How can I focus my search?
- I retrieved too few citations. How can I expand my search?
- I'm not finding what I need. How does a PubMed search work?
- Is there a guide to NLM resources for MEDLINE/PubMed?
- I need further assistance and training.

## How do I search PubMed? Quick Tour

1. Identify the key concepts for your search.
2. Enter the terms (or key concepts) in the search box.
3. Suggestions will display as you type your search terms. Click Turn off to temporarily disable the autocomplete feature. The autocomplete feature is based on PubMed query log analysis described in "Finding Query Suggestions for PubMed."
4. Click Search. Click here to run this search in PubMed.

| Example |
| --- |
| What role does pain have in sleep disorders? |
| The key concepts are: |
| pain |
| sleep disorders |

## How do I search by author? Quick Tour

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

| Example |
| --- |
| Watson JD |
| Lederberg J |

Click Advanced to use the search builder, and then select Author from the All Fields menu. The author search box includes an autocomplete feature.

| Example |
| --- |
| To search for citations to articles written by Bonnie W. Ramsey about gene therapy for cystic fibrosis enter the following search terms into the search box: |
| cystic fibrosis gene therapy ramsey bw |

| Example |
| --- |
| Full author names may be searched for citations published from 2002 forward if the full author name is available in the article: |
| Joshua Lederberg |
| Garcia Algar, Oscar |

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

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.

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

**Stopwords**

| | Stopwords |
| --- | --- |
| A | a, about, again, all, almost, also, although, always, among, an, and, another, any, are, as, at |

*Stopwords continued from previous page.*

| | Stopwords |
|---|---|
| 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, use, used, using |
| V | various, very |
| W | was, we, were, what, when, which, while, with, within, without, would |

## How do I search by journal name?

Enter the journal name or abbreviation in the search box.

| Example |
|---|
| To search for articles about drosophila in the journal Molecular Biology of the Cell enter the following in the search box: |
| molecular biology of the cell drosophila |

Click Advanced to use the search builder, and then select Journal from the All Fields menu.The journal search box includes an autocomplete feature.

## How do I find a specific citation? I have some information such as the author, journal name and the year the article was published.

Enter the information in the search box and the PubMed citation sensor will automatically analyze the search for citation information.

Alternatively, use the Single Citation Matcher to find citations with a fill-in-the-blank format:

1. Click Single Citation Matcher from the PubMed homepage.
2. Enter the information you have in the fill-in-the-blank boxes.
3. Click Go.

## Is there anything special for clinical searches?

From the Clinical Queries page you can search by a clinical study category, find systematic reviews and run medical genetics searches.

## Clinical study category

The clinical study categories use built-in search filters that will limit retrieval to citations to articles reporting research conducted with specific methodologies, including those that report applied clinical research. To find citations for a specific clinical study category:

1. Click Clinical Queries from the PubMed homepage or from the advanced search more resources menu.
2. Enter your search terms in the search box, and then click search.
3. You may then change the category or scope, if desired.

| Example |
| --- |
| If you are researching the clinical aspect of gene therapy for cystic fibrosis, from the Clinical Queries page, select the category "Therapy" and the Scope "Narrow" and enter the following search terms in the search box: |
| cystic fibrosis gene therapy |

## How do I find systematic reviews or medical genetic searches?

Systematic Reviews is available on result sets as a filter under article types, as well as a selection on the Clinical Queries page.

1. Click Clinical Queries from the PubMed homepage or from the advanced search more resources menu
2. Enter search terms in the search box, and then click Search.
3. For medical genetics, change the search topic, if desired.

| Example |
| --- |
| If you are researching systematic reviews on inhalation therapy for pneumonia from the Clinical Queries page, enter the following search terms in the search box: |
| inhalation therapy pneumonia |

| Example |
| --- |
| To find information on sickle cell anemia and genetic counseling from the Clinical Queries page, enter the following search terms in the search box, and then choose genetic counseling from the topic menu: |
| sickle cell anemia |

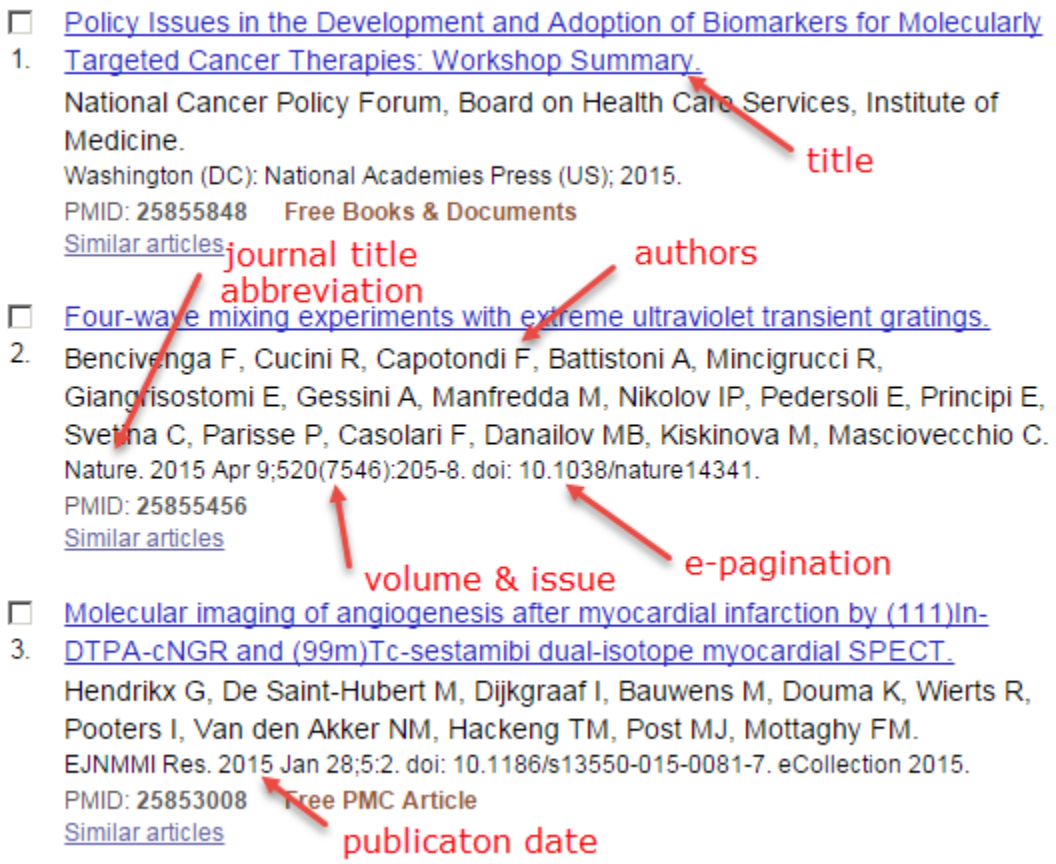
## Can you explain the search results?

PubMed search results are displayed in a summary format, see the anatomy of search results page below.

Citations are initially displayed 20 items per page with the most recently entered citations displayed first.

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

**Anatomy of the Summary Results**




## How do I display an abstract?

Click the title of the article to see the abstract. "No abstract available" is indicated on citations without an abstract.

## How can I get a copy of the article?

YouTube Tutorial

PubMed search results do not include the full text of the journal article. However, the abstract display of PubMed citations may provide links to the full text from other sources, such as directly from a publisher's web site.

The full text journal site may require a subscription although access may be available through your local medical library. In addition, online journals sometimes provide free access. Consider visiting your local medical library if there is not an online copy available.

For more information on obtaining the article, see How to Get the Journal Article.

## How can I save my results?

There are several ways to save PubMed search results including using the **Clipboard** to save citations temporarily and My NCBI Collections to save indefinitely.

1. Click the check box to the left of the citations you want to save.
2. From **Send to**, select **Clipboard**.
3. To display the items in the clipboard, click the **Clipboard** items link.

For additional information see Saving Citations Temporarily using the Clipboard.

For other save options, see:

- Saving and Managing Searches
- Creating a URL to Bookmark Your Search
- Saving Citations as a Text File
- Exporting Citations to a Citation Management Program

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

Tutorial

To limit the number of search results:

- Replace general search terms with more specific ones (e.g., search for low back pain instead of back pain).
- Add additional terms to your search.
- Use the sidebar filters to restrict your results by publication dates, species, article types, etc.
- Click manage filters in the **Filter your results** portlet to change your My NCBI filter selections.

| Example |
| --- |
| If the search pain sleep disorders retrieves too many citations consider adding more specific search terms to focus your results, such as facial pain sleep disorders. |

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

- Click the **Similar Articles See all** link for a relevant citation to display a pre-calculated set of PubMed citations closely related to the article.
- Remove extraneous or specific terms from the search box.
- Try using alternative terms to describe the concepts you are searching.

| Example |
| --- |
| If your search, facial pain sleep disorders, retrieves too few citations consider removing search terms to broader the search and retrieve more citations such as, pain sleep disorders. |

## I'm not finding what I need. How does a PubMed search work?

PubMed may modify your search terms to enhance your retrieval.

To see how PubMed modified your search, consult the 'Search details' box displayed on the results page and click the "See more…" link for further information.

For additional information, see How PubMed works: Automatic Term Mapping.

| Example |
| --- |
| If you search for cystic fibrosis by its abbreviation cf, the cf search retrieves some citations that do not discuss cystic fibrosis. To see why PubMed retrieved these citations, consult the Search details portlet to see that PubMed translated cf to search for citations about cerebrospinal fluid or cf. |

## I need further assistance and training

## Contacting 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] | Grant Number [GR] | Pharmacological Action [PA] |
| Article Identifier [AID] | Investigator [IR] | Place of Publication [PL] |
| All Fields [ALL] | ISBN [ISBN] | PMID [PMID] |
| Author [AU] | Issue [IP] | Publisher [PUBN] |
| Author Identifier [AUID] | Journal [TA] | Publication Date [DP] |
| Book [book] | Language [LA] | Publication Type [PT] |
| Comment Corrections | Last Author [LASTAU] | Secondary Source ID [SI] |
| Corporate Author [CN] | Location ID [LID] | Subset [SB] |
| Create Date [CRDT] | MeSH Date [MHDA] | Supplementary Concept[NM] |
| Completion Date [DCOM] | MeSH Major Topic [MAJR] | Text Words [TW] |
| Conflict of Interest [COIS] | MeSH Subheadings [SH] | Title [TI] |
| EC/RN Number [RN] | MeSH Terms [MH] | Title/Abstract [TIAB] |
| Editor [ED] | Modification Date [LR] | Transliterated Title [TT] |
| Entrez Date [EDAT] | NLM Unique ID [JID] | UID [PMID] |
| Filter [FILTER] | Other Term [OT] | Version |
| First Author Name [1AU] | Owner | Volume [VI] |
| Full Author Name [FAU] | Pagination [PG] | |
| Full Investigator Name [FIR] | Personal Name as Subject [PS] | |

## 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. The Abstract format displays affiliation for citations with fewer than 100 authors. PubMed includes the note "Contributed equally" in the affiliation field if this information is supplied by publishers.

## Article Identifier [AID]

Includes article identifiers submitted by journal publishers such as doi (digital object identifier). These data are typically used for generating LinkOut links.

## All Fields [ALL]

Untagged terms and terms tagged with [all fields] are processed using Automatic Term Mapping. Terms that do not map are searched in all search fields except for Place of Publication, Transliterated Title, Create Date, Completion Date, Entrez 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.

## 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. Full names display in the FAU field on the MEDLINE display format. Various limits on the number of authors included in the MEDLINE citation have existed over the years (see NLM policy on author names).

**MEDLINE Display**

| | More Details: | MEDLINE/PubMed Data Element (Field) Descriptions |
|---|---|---|
| **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 |

*MEDLINE Display continued from previous page.*

| | More Details: | MEDLINE/PubMed Data Element (Field) Descriptions |
|---|---|---|
| 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 |

*MEDLINE Display continued from previous page.*

| | More Details: | MEDLINE/PubMed Data Element (Field) Descriptions |
|---|---|---|
| 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 |

## 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

## 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.

## Completion Date [DCOM]

The date NLM completed processing the citation. Completon Date is not included in All Fields retrieval; the [dcom] search tag is required.

## Editor [ED]

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

## 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).

## Entrez Date [EDAT]

Date the citation was added to the PubMed database. 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 Entrez Date was set to the Publication Date on citations published before September 1997. Entrez Date is not included in All Fields retrieval; the [edat] search tag is required.

Search results are displayed in Entrez Date 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].

Note: The Entrez Date is not changed to reflect the date a publisher supplied record is elevated to in process or when an in process record is elevated to indexed for MEDLINE.

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 or Collaborator Name [FIR]

The index for the article's full investigator or collaborator name, if available. Full investigator searching can be searched 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 codes and agency abbreviations used in grant numbers for the 2-character abbreviations, PHS agency acronyms, and other US and non-US funding organization.

**More information about grant numbers:**

- NIH grant numbers, e.g., 5R01CA101211-03, typically have three main parts:
  - A prefix that indicates the type of grant, e.g., 5R01
  - An 8-character serial number consisting of a 2-character grant abbreviation and a 6-digit number, e.g., CA101211
  - 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].

## ISBN [ISBN]

The ISBN for book or book chapters.

## Issue [IP]

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

## 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]

## 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 Entrez Date after March 4, 2000. The MeSH Date is initially set to the Entrez Date when the citation is added to PubMed. If the MeSH Date and Entrez Date on a citation are the same, and the Entrez 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 Subheadings**

| 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 |

*MeSH Subheadings continued from previous page.*

| Abbreviation | MeSH Subheading | Abbreviation | MeSH Subheading |
|---|---|---|---|
| GE | Genetics | TD | Trends |
| GD | Growth and Development | UL | Ultrastructure |
| HI | History | UR | Urine |
| IM | Immunology | VE | Veterinary |
| IN | Injuries | VI | Virology |

## 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 contains approximately 26 thousand terms and is updated annually to reflect changes in medicine and medical terminology. MeSH terms are arranged hierarchically by subject categories with more specific terms arranged beneath broader terms. 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.

Notes on 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 MeSH 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 & 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]

Note:

- 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].

**Publication Types**

| See 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 |
| English Abstract |
| Equivalence Trial |
| Evaluation Studies |
| Expression of Concern |
| Festschrift |
| Government Document |
| Guideline |
| Historical Article |
| Interactive Tutorial |
| Interview |

*Publication Types continued from previous page.*

| See complete list of Publication Types. Publication types found in PubMed are listed below. |
|---|
| 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<br>Systematic Review |
| Technical Report |
| Twin Study |
| Validation Studies |
| Video-Audio Media |

*Publication Types continued from previous page.*

| |
|---|
| See complete list of Publication Types. Publication types found in PubMed are listed below. |
| Webcasts |

## 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.

The SI field and the NCBI sequence database links are not linked. The PubMed links to these databases are created from the reference field of the GenBank or GenPept flat file. These references include citations that discuss the specific sequence presented in these flat files.

## 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 Finding Related Links for a Citation 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 All Fields or Text Word retrieval so you must search terms using the [tt] search tag.

## Version

The PMID of a versioned citation is persistent. To retrieve previous versions use the format PMID.version, e.g., 20029666.4. The abstract display includes an "Other versions" link that lists the previous versions and corresponding publication date. Only the most recent version of a citation will be indexed, therefore the content, e.g., author names, abstract terms, from previous versions will not be retrieved for PubMed searches. Search ispreviousversion to retrieve all previous versions of citations.

## Volume [VI]

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

# Searching PubMed

**Section Contents**


- A basic search and automatic term mapping Quick Tour
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- Filtering searches
- Combining searches using History
- Browsing the index of terms
- Searching for a phrase
- Truncating search terms
- Combining search terms with Boolean operators (AND, OR, NOT)
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- Finding a citation using the Single Citation Matcher
- Finding citations related to a citation
- Using Clinical Queries
- Finding systematic reviews


## A basic search Quick Tour

1 Identify the key concepts for your search.

| Example |
| --- |
| Find citations about bronchodilators for treating asthma in children. |
| The key concepts are bronchodilators, asthma and children |

1. Enter terms into the search box.
2. Press the Enter key or click Search.

A spell checking feature suggests alternative spellings for search terms that may include misspellings.

A citation sensor displays results for searches that include terms characteristic of citation searching, e.g., author names, journal titles, publication dates, and article titles.

A gene sensor checks queries, and if it detects the symbol for a gene, links to the Gene database.

Recent Activity displays your recent database searches and document views.

Additional sensors and discovery ads related to your search may display with your results.

## Searching by author Quick Tour

Enter the author's name in the format of last name followed by initials. Omit punctuation.

| Examples |
| --- |
| smith ja |
| jones k |

**More information about author searching:**

- Click Advanced and use the **builder**. Select Author from the All Fields menu and enter an author's name. The author search box includes an autocomplete feature.
- 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].
- If only the author's last name is entered, tag the name with the author search field [au], to find the name in the author field only.
- Use the [1au] tag to search for the first personal author or [lastau] to search for the last personal author name in a citation.
- 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.

| Example |
| --- |
| woods [au] |

Full author names may be searched for citations published from 2002 forward if the full author name is available in the article. Enter a full author name in natural or inverted order, e.g., julia s wong or wong julia s.

| Example |
| --- |
| Joshua Lederberg |
| Garcia Algar, Oscar |

**More information about full author searching:**

- 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].

## Searching by journal title Quick Tour

Enter in the search box one of the following:

- 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)

| Example |
| --- |
| new england journal of medicine |

To find full journal names, use the NLM Catalog, or mouseover the citation journal abbreviation.

1. Click Journals in NCBI Databases on the PubMed homepage.
2. Enter the journal name and click Search.

**More information about journal searching:**

- Click Advanced and use the **Builder**. Select Journal from the All Fields menu and enter a journal title. The journal search box includes an autocomplete feature.
- Tag the journal title by using the search field [ta] to limit your search to only the journal, 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.

**Journal Lists**

| PubMed Journals | NCBI Molecular Biology Database Journals | PubMed and NCBI Molecular Biology Database Journals |
| --- | --- | --- |
| Uncompressed | Uncompressed | Uncompressed |
| GNU zip | GNU zip | GNU zip |
| UNIX Compress | UNIX Compress | UNIX Compress |
| PKZIP | PKZIP | PKZIP |

## Searching by date

1. Click Advanced and use the **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 to ‘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]. There is a selection of date fields to use:

- 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]
- Entrez Date [edat] - The date the citation first entered PubMed.
- 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.

| Example |
| --- |
| 1997/10/06 [edat] |
| 1998/03/15 [dp] |
| 1997 [edat] |
| 1997/03 [dp] |

### Searching for a date range in the search box

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

| Example |
| --- |
| 1993:1995 [dp] |
| 1997/01:1997/06 [edat] |
| 2002:2009[crdt] |

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"**[Search Tag]**
- term="last **X** months"**[Search Tag]**
- term="last **X** years"**[Search Tag]**

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

## Filters

YouTube Tutorial

You can narrow your search results by article types, text availability, publication dates, species, languages, sex, subjects, journal categories, ages and search fields.

1. Run a search in PubMed.
2. To activate a sidebar filter, click the filter selection. A checkmark will appear next to the activated filters.
3. Subsequent searches will be filtered until the selected filters are cleared.

Note:

- To add additional filter categories to the sidebar, click the "Show additional filters" link, select the additional categories, and then click Show. To activate the additional filters, click the filter selection.
- When filters are selected a **Filters activated** message will display on the results page.
- To turn off filters, click either the "Clear all" link to remove all the filters, the "clear" link next to a filter category to clear the selections within that category, or the individual filter.

- Citations may be excluded for some filter selections because they have not yet completed the MEDLINE indexing process.
- Users can also activate additional filters with My NCBI filters.

## Article types

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

Click the “more …” link, to add additional article types, and then click Show. The complete list of MEDLINE publication types is available. Systematic review articles are produced using a search strategy.

This filter 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’.

| Example |
| --- |
| neoplasms AND hasabstract |

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

## Publication Dates

From the filter sidebar Publication dates category, click 5 years, 10 years, or enter a date in the custom range box to filter your results by publication date.

## Species

Species selections restrict your results to human or animal studies.

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

## Languages

To add languages to the sidebar, click the “Show additional filters” link, select Languages, and then click Show. Language selections restrict your search to articles written in the specific language.

Click the “more …” link, to add additional languages, and then click Show.

## Sex

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

To add sex to the sidebar, click the “Show additional filters” link, select Sex, and then click Show.

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

## Subjects

Subject filters restrict retrieval to specific subjects.

To add subjects to the sidebar, click the “Show additional filters” link, select Subjects, and then click Show. Subject filters include:

- AIDS
- Bioethics
- Cancer
- Complementary Medicine
- Dietary Supplements
- History of Medicine
- Systematic Reviews
- Toxicology
- Veterinary Science

Subjects use a specialized search strategy.

Subjects can also be searched using the respective search value of **aids, bioethics, cancer, cam, dietsupp, history, space, systematic**, **tox** or **veterinary** followed by the [sb] search tag. The Systematic reviews selection is included in the article types' category.

| Example |
| --- |
| asthma AND cam [sb] |

## Journal categories & more subsets

To add journal categories to the sidebar, click the “Show additional filters” link, select Journal categories, and then click Show.

The Journal/Citation subsets restrict retrieval to specialized journals or articles on specialized topics in other journals. The table 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.

| Example |
| --- |
| neoplasms AND jsubsete |
| This search will filter your retrieval to citations from bioethics journals or selected bioethics citations from other journals. |

The Journal/Citation subset does not require a search tag.

**Journal/Citation Subsets**

| 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 |

*Journal/Citation Subsets continued from previous page.*

| Subset Code | Journal/Citation Subset |
|---|---|
| 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].

| Example |
|---|
| protein p53 AND 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 processing stage of an article in the PubMed database (see PubMed Citation Status Subsets).

The status tags are included in the XML and MEDLINE displays. To search for a particular citation status, enter one of the search terms below followed by the [sb] search tag

- publisher
- inprocess
- medline
- oldmedline
- pubmednotmedline

| Example |
|---|
| n engl j med AND medline [sb] |

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

**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. |

*Status Subsets continued from previous page.*

| How to Search | Citation Status |
|---|---|
| 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. |
| oldmedline[sb] | Identifies citations in the OLDMEDLINE subset. |

### 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.

| Example |
|---|
| pubstatusaheadofprint AND gene |

Following publication of the completed issue, the date an article was published electronically is also displayed, e.g. Proc Natl Acad Sci U S A. 2003 Apr 1;100(7):3925-9. Epub 2003 Mar 24.

## Ages

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

To add ages to the sidebar, click the “Show additional filters” link, select Ages, and then click Show.

Age filters include:

- 80 and over: 80+ years
- Adolescent: 13-18 years
- Adult: 19+ years
- Adult: 19-44 years
- Aged: 65+ years
- Child: 0-18 years
- Child: 6-12 years
- Infant: 1-23 months
- Infant: birth-23 months
- Middle Aged + Aged: 45+ years
- Middle Aged: 45-64 years
- Newborn: birth-1 month
- Preschool Child: 2-5 years
- Young Adult: 19-24 years

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

## Search Fields

Choose a search field to limit all terms entered in the search box to the selected field.

Click the "Show additional filters" link, select Search fields, and then click Show. Click the Choose... link under Search fields, select a search field, and then click Apply.

# Advanced Search

YouTube Tutorial

- Searching by a specific field
- Browsing the index of terms
- Combining searches using history
- Previewing the number of search results

## Searching by a specific field

Use the Advanced search **Builder** to search for terms in a specific search field.

- To search by **author**, select Author from the All Fields menu, and then enter an author's name, the name will automatically display in the search box. The author search box includes an autocomplete feature.
- To search by journal, select Journal from the All Fields menu, enter a journal name; the journal search box also includes an autocomplete feature.
- To search for other fields in a citation, use the pull-down menus to select a field before entering a term in the search builder box.
- Terms entered in the builder are automatically added to the search box.
- Note that the default Boolean operator is AND; if desired, choose OR or NOT from the pull-down menu.

You may also search a specific field, and bypass the automatic term mapping, by adding a search tag to a term (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]).

| Example |
| --- |
| aromatherapy [mh] |

## Browsing the index of terms

The Advanced search builder **Show index list** provides an alphabetical display of all terms in each PubMed search field. You can browse by all fields or within a specific field such as MeSH Subheadings.

1. Click **Advanced** and use the **Builder** to select a search field from the All Fields menu.
2. Enter a term in the search box, and then click **Showindex list**.
3. The index displays an alphabetic list of search terms and the number of citations for each term. Click Previous or Next to move within the index.
4. Scroll until you find a term and then highlight it to add it to the search box.

**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.

## Previewing the number of search results

Use the **Add to history** link in advanced search to display the items found before displaying the search results:

1. Click **Advanced**.
2. Use the builder to add search terms to the search box.
3. Click **Add to history** to display the number of results in history.
4. To display the citations, click the history **Items found** link.

## Combining searches using History

Searches can be combined or used in subsequent searches using the search number from Advanced search **History**.

1. Click **Advanced**.
2. In **History**, click **Add** to move the search to the Builder.
3. Alternatively, click the search number to display additional options to add the search to the Builder, including Boolean operators OR or NOT. Other menu options include:
   - Delete from history
   - Show search results
   - Show search details
   - Save in My NCBI
4. Add additional search terms in the builder.
5. Click Search.

| Examples |
| --- |
| #2 AND #6 |
| #3 AND (drug therapy OR diet therapy) |
| #5 gene therapy |

**More information about the History:**

- The history will be lost after 8 hours of inactivity on the NCBI web site.
- Click Clear history to delete all searches from history.
- Click “Download history” to generate a CSV file. Please note that 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.
- PubMed will move a search statement number to the top of the History if a new search is the same as a previous search.
- History search numbers may not be continuous because some numbers are assigned to intermediate processes, such as displaying a citation in another format.
- The maximum number of searches available in History is 100. Once the maximum number is reached, PubMed will remove the oldest search from history and add the most current search.
- A separate history will be retained for each database, although the search numbers will be assigned sequentially for all databases.
- The history feature requires your web browser to be set to accept cookies.
- 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.

## Searching for a phrase

PubMed does not perform adjacency searching. However, many phrases are recognized by the MeSH 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. If a phrase is not recognized you can bypass ATM and search for a phrase using the following formats:

| Examples |
| --- |
| • Enclose the phrase in double quotes: "kidney allograft"<br>• Use a search tag: kidney allograft[tw]<br>• Use a hyphen: first-line<br>• Truncate: kidney allograft* |

**More information for phrase searching:**

- If you use a hyphen or quotes and the phrase is not found, the hyphen or quotes are ignored and the phrase is processed using automatic term mapping. Phrases may appear in a PubMed record but not be in the phrase index.
- When you enter your 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 a word in a multi-word search may result in an unexpected phrase search. For example the search, fetus infection* maternal will treat fetus infection* as a phrase. The results page search details box includes the search translations.
- To browse the indexed phrases, use the Advanced search builder show index list. Select a search field, enter the beginning of a phrase, and then click Show index list.

## Truncating search terms

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

| Example |
| --- |
| flavor* |
| Finds terms that begin with the root term flavor, such as flavored, flavorful, flavoring, etc. |

**More information about truncation:**

- PubMed searches for the first 600 variations of a truncated term. If a truncated term (e.g., tox*) produces more than 600 variations, a warning message displays to lengthen the root word to search for all endings.
- 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.
- Truncating a word in a multi-word search may result in an unexpected phrase search. For example the search, fetus infection* maternal will treat fetus infection* as a phrase.
- Truncation stops at the end of a term, that is, it does not process beyond a space.

## 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, e.g., journal name, volume, page number.

1. Click Single Citation Matcher on the **PubMed homepage** or from the Advanced search more resources menu.
2. Enter the citation information.
3. 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.

## 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.

| Examples |
| --- |
| Find citations on DNA that were authored by Dr. Crick in 1993:<br>dna [mh] AND crick [au] AND 1993 [dp] |
| Find citations on the effects of heat or humidity on multiple sclerosis:<br>(heat OR humidity) AND multiple sclerosis |
| Find citations about arthritis excluding the Publication Type Letter:<br>arthritis NOT letter [pt] |

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.

| Example |
| --- |
| common cold AND (vitamin c OR zinc) |

**More information about using Boolean operators:**

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)

- In a multi-word search PubMed will use 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.
- The search details portlet displays how a search is translated.

## Finding citations related to a citation

Consult the Similar articles displayed on the abstract format.

The Similar articles **See all…**link will retrieve a pre-calculated set of PubMed citations that are closely related to the selected article. The similar articles will be displayed in ranked order from most to least relevant, with the "linked from" citation displayed first.

**More information about similar articles:**

- The set of similar articles is generated by comparing words from the title, abstract, and MeSH terms using a word-weighted algorithm.
- Select PubMed from the **Find Related Data** portlet to retrieve similar articles for your result set.
- Filters are not activated for similar articles results; however, subsequent searches will include filters selected prior to displaying similar article results.
- You can refine the list of similar articles using **Advanced**History where the similar articles retrieval is represented as "Similar articles for PubMed (Select PMID)." Use this Search number in a search. The similar articles retrieval list is displayed in ranked order from most to least relevant; however, refining the list removes the ranked order and may remove citations that are most relevant.

## Using 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 or from the advanced search more resources menu.
2. Enter your search terms in the search box
3. Select a Category: Therapy, Diagnosis, Etiology, Prognosis, or Clinical prediction guides
4. Select a Scope: Narrow (specific search) or Broad (sensitive search)
5. Click Search

| Example |
| --- |
| Find research on diagnosing cystic fibrosis. |

*Table continued from previous page.*

| Example |
| --- |
| On the Clinical Queries page |
| Enter cystic fibrosis in the search box. |
| Choose “diagnosis” under Category and “narrow” under Scope, click Search. |

## 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 or from the advanced search more resources menu
2. Enter your search terms in the search box
3. Click Search

| Example |
| --- |
| Find Systematic Reviews on inhalation therapy for pneumonia. |
| Go to the Clinical Queries page |
| Enter the search terms inhalation therapy pneumonia into the search box, click Search. |

Alternatively, 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 or from the advanced search more resources menu
2. Enter search terms in the search box
3. Choose a specific topic, if applicable
4. Click Search.

| Example |
| --- |
| Find information on genetic counseling for sickle cell anemia. |
| Go to the Clinical Queries page |
| Enter the search terms sickle cell anemia into the search box. |
| Under Medical Genetics choose Genetic Counseling, click Search. |

# Understanding Your Search Results

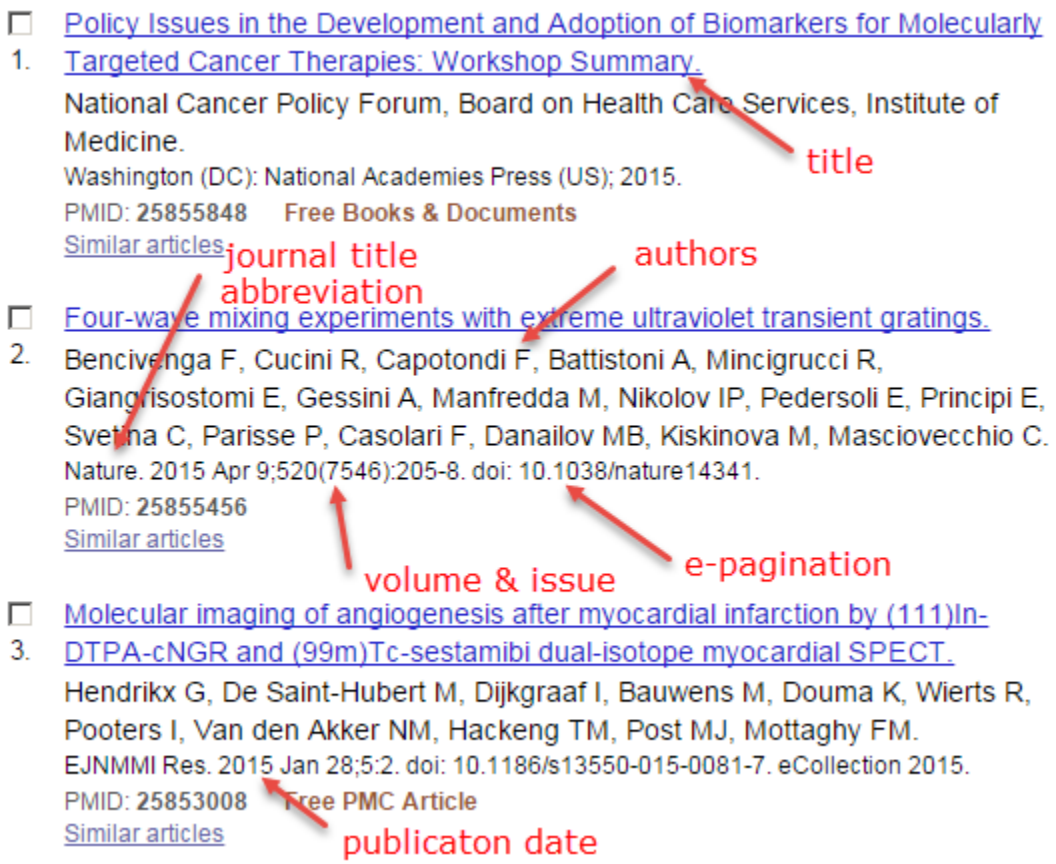
Search results initially display in a summary format in the order they were entered in PubMed as last in, first out. You can change the display format.

A default of 20 citations is displayed per page. If there are more than 20 citations, they will be displayed on subsequent pages.

To display the abstract for a journal article, click the title for each citation. Citations that don't include an abstract display the notation "No abstract available."

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.

**Anatomy of Summary Results**




For additional information see: Displaying and Sorting Your Search Results

# Displaying and Sorting Your Search Results

**Section Contents**

Modify your display settings for:

- Changing the citation format
- Changing the number of items per page
- Sorting your search results

Use **Send to** for:

- Saving citations in a File
- Saving citations temporarily in your Clipboard
- Saving citations permanently in My NCBI Collections
- E-mailing citations
- Printing search results

Use the results page controls to:

- Move to another page

## Changing the citation display format

Results are initially displayed in the Summary format, except a single citation result will display the abstract format. You can change the display for all or selected citations by selecting a format from the **format** menu.

To change the display format only for selected citations, click the check box to the left of each citation before selecting a display format.

See PubMed Citation Display Formats for a description of all the formats.

**Display Formats**

| Display Format | Format Description |
|---|---|
| **Summary** | This format may include: Authors, Corporate Authors, Title (Titles originally published in a language other than English are translated and displayed in brackets), Journal source, Review Publication Type, language if the article is not in English, "No abstract available" notation, PMID, and Comment/Correction links. Summary also displays a link fo Similar articles.<br>**Note**: Summary (text) uses the NISO and ISO reference standards documented in *Citing Medicine*. |
| **Abstract** | This format may include: Journal Source, Comment/Correction links, Title, language if article is not in English, Authors, Collaborators, Corporate Author, Affiliation (for citations with fewer than 100 authors), Abstract, Non-English language abstract, Author Keywords, Image thumbnails from PMC articles, Publication Types (except for the Journal Article publication type), MeSH Terms, Personal Name as Subject, Substances, Supplementary Concepts, Secondary Source databank accession numbers, Grant numbers, PMID, citation MEDLINE status, and social media icons.. Search links are available from Journal Title Abbreviations, Authors, MeSH Terms, Publication Types, Substances, Supplementary Concepts, Grant Support, Secondary Source ID, and Personal Name as Subject. Some fields link to search results.<br>**Note**: The Abstract (text) format does not include MeSH data. |
| **MEDLINE** | Two-character tagged field format (Table 8) for the complete record. Use this format to export citations into citation management programs. |
| **XML** | EXtensible Markup Language tagged format is a standard maintained by the World Wide Web Consortium (W3C). Users running scripts to downloading data in XML should use E-Utilities rather than the web version of PubMed. A document describing the MEDLINE XML data element descriptions is available. PubMed XML includes a PubMed Data section with publication status, dates, and article IDs not present in the MEDLINE XML: PubStatus: pubmed = Entrez Date, medline = MeSH Date, entrez = Create Date |
| **PMID List** | PMIDs (PubMed IDs) |

## Changing the number of citations shown per page

From the **per page** menu displayed at the top of the results page, select the number of **items per page** to display. You can change the number of citations displayed on a single page from 5 to 200 items.

## Sorting your search results

Select a **sort by** option. Sort options include: Most Recent, Best Match, Publication Date, First Author, Last Author, Journal, and Title.

**More information about sorting:**

- A modified sort by selection will be active for subsequent searches until 8 hours of inactivity on the NCBI web site.

- Citations in PubMed 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.
- The retrieved by best match sort order for search results is based on an algorithm that analyzes each PubMed citation that includes the 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. If any technical constraints prevent the machine-learning architecture from re-ranking the results, the sort will revert to the standard best match algorithm. Please see the NLM Technical Bulletin article for more information.
- 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.
- First author, last author and journal sort A to Z; the secondary sort is publication date. First author sorting incorporates all author names in a citation.
- Results for related data, e.g., similar articles, display in ranked order and display the sort by option: Sorted by Link Ranking.
- 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. The results sort notation will display as, “Sort by: Author.” Author name disambiguation details are available in Liu W and Wilbur WJ.

## Printing 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:

- Changing the number of citations shown per page
- Changing the citation display format

## Move to another page of search results

The results display the number of citations retrieved and the number of pages necessary to display all the results. Use the **per page** menu to change the number of citations shown per page.

Click **Next** or **Prev** to move back or forward to adjacent pages and **Last** or **First** to display the first and last page of your results.

# Finding Related Resources for a Citation

**Section Contents**


- Discovering related data in NCBI databases
- Finding related resources using LinkOut
- Displaying References for a PubMed Central article
- Finding PubMed Central articles that have cited an article
- Finding Bookshelf books that have cited an article
- Reporting broken or problem links

## Discovering related data in NCBI databases

Related NCBI databases for summary results are available from the **Find Related Data** portlet. Select a database, and then choose a database. PubMed typically only processes the first 5,000 to 10,000 items; the complete list of database options and the maximum items processed is available.

Use the **Related information** abstract portlet to link to other related NCBI databases for the selected citation.

The Abstract format supplemental information, available for MEDLINE indexed citations, links to PubMed, MeSH and other NCBI databases.

**Note**: To simultaneously search all NCBI databases choose All Databases from the Search pull-down menu, enter a search term, and then click Search.

## Finding related resources using LinkOut

Most PubMed records include LinkOut resources to a variety of web sites 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.

To display the LinkOut resources open the **LinkOut** section included at the end of the abstract format. The LinkOut section is available when you display a single record in the abstract format.

To find citations with links to free full-text articles, click the **Filter your results** Free Full Text link.

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 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.
- Use My NCBI to customize your LinkOut preferences to display only links of interest to you.

## Displaying References for a PubMed Central article

The PubMed abstract may include **References for this PMC Article** for full text articles in PubMed Central. The link displays the PubMed references for the PMC article.

## Finding PubMed Central articles that have cited an article

The PubMed abstract may include a **Cited by PubMed Central articles** portlet for PubMed citations cited by PubMed Central articles. The Cited in PubMed Central portlet lists the articles in PubMed Central for the cited PubMed citation.

## Finding Bookshelf books that have cited an article

The abstract **Cited in Books** link is available for PubMed citations cited in the bibliography of a Book in the Bookshelf.

## 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.

# Displaying the Search Details

PubMed may modify or add additional search terms to your search to optimize retrieval.

See the results page **Search details** box to view your search as it was translated using automatic term mapping and search rules.

**More information about Details:**

- The Query Translation box shows the search strategy used to run the search.
  - To edit the search in the Query Translation box, add or delete terms and then click Search.
  - Click URL to display the current search as a URL to bookmark for future use. Searches created using History numbers can not be saved using the URL feature.
- The Result number link displays the total number of citations for the search.
- Translations details how each term was translated using PubMed's search rules and syntax.
- User Query shows the search terms as you entered them in the search box and any syntax errors with the query.
- If your last action was displaying a similar article set or selected items in another format, Details will indicate this rather than the last query.

# Saving and E-mailing Results and Searches

**Section Contents**

- Saving citations temporarily using the Clipboard or indefinitely using My NCBI Collections including Favorites YouTube Tutorial
- Saving citations as a text file
- Exporting citations into citation management software
- E-mailing citations
- Saving searches with My NCBI
- Saving searches as RSS (Really Simple Syndication) feeds
- Creating a URL to bookmark your search

## Saving citations temporarily using the Clipboard

The Clipboard provides a place to collect selected citations from one or several searches. The Clipboard will be lost after 8 hours of inactivity on PubMed or other NCBI databases.

You may also save your search results indefinitely using My NCBI Collections.

To add citations to the Clipboard:

1. In your search results, use the citation check boxes to select citations. To save all your citations do not click any check boxes.
2. Use **Send to**, and select **Clipboard**.

3. To view your selections, click the **Clipboard portlet items link**.

To delete citations from the Clipboard:

- Use the **Remove from clipboard** link to delete individual items, or use the check boxes to select items to delete, and then click the **Remove selected items** link.
- To delete all citations from the Clipboard, do **not** select any items, click the **Remove all** link.

**More information about the Clipboard:**

- Citations in the clipboard display **item in clipboard.**
- The clipboard portlet displays the total number of items in the clipboard. A link to the clipboard is also available under the homepage PubMed Tools.
- 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 be set to 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.

## Saving citations as a text file

1. In your search results, use the citation check boxes to select citations. You may move to other pages to continue your selections. If you do not make any selections, PubMed will save the entire retrieval.
2. From **Send to**, select **File**.
3. Your web browser will prompt you to save the PubMed search results in a file on your computer.

**More information about saving citations to a file:**

- Saving a large retrieval may take several minutes.
- The default for the send to file feature is to save the entire retrieval unless you select specific citations. For example, if you use send to file for results displaying 1 to 20 of 2,356, your saved file will contain all 2,356 citations.
- Select format CSV to generate an abbreviated summary citation in a comma separated file.
- To save citations in HTML format, use the Save as function of your browser. Change the file extension to html. When saving as HTML, only those citations displayed on the page will be saved; therefor, consider changing the number of items per page.

## Exporting citations into citation management software

To export citations into a citation management software program such as EndNote, Mendeley or Citavi:

1. In your search results, use the citation check boxes to select citations. To export all the citations do not select any citations.
2. From **Send to**, select **Citation manager**.
3. Import this saved file into your citation management program.

Questions regarding commercial software packages should be directed to the respective companies.

## E-mailing citations

1. In your search results, use the check boxes to select citations. To e-mail all citations displayed on the page, do not make any selections.
2. From **Send to**, select **E-mail**.
3. Choose selections for Format, Sort by Number to send, and start from citation.
4. Enter an e-mail address. You may also enter additional text that will be included in the e-mail.
5. Click E-mail. The system returns you to your results page and displays a confirmation e-mail sent message.

Note: Use My NCBI to create an automatic e-mail update for searches.

Your PubMed results will be sent from the NCBI automatic mail server, Sent by NCBI [nobody@ncbi.nlm.nih.gov], with a "Subject" of PubMed Search Results. Do not reply to this message. This is not a functioning customer service e-mail address.

**More information about e-mailing citations:**

- You may e-mail up to 200 items at a time to a single e-mail address.
- The search will be included in your results email, or a notation indicating the number of selected items.
- The CAPTCHA image does not display for users that are signed in to My NCBI.

## Saving searches as RSS (Really Simple Syndication) feeds

PubMed RSS feeds use the My NCBI “What’s New” strategy for updating searches; therefore, you will only retrieve new items for your search since the last time you were connected to your RSS reader.

To create an RSS search feed:

1. Run a search in PubMed.
2. Click **RSS** located below the **Search box**.
3. You may edit the **feed name** and limit the **number of items displayed**, and then click Create RSS. If the number of citations retrieved is greater than the number of items displayed the feed will include a link to display the complete PubMed retrieval.
4. Click the XML icon to display the XML and copy and paste the URL into the subscribe form in your RSS reader. Web browsers and RSS readers may use different options to copy the feed.

An RSS reader is required to use this service.

## Creating a URL to bookmark your search

You can create a URL with your search terms that can be bookmarked in your web browser for future use, see creating a web link to PubMed.

1. Alternatively, run a search and then click **See more** in results page search details box.
2. Click URL below the Query Translation box.
3. Bookmark the URL using your web browser function. You can also copy the URL from the web browser’s URL address box.

**More information about creating a bookmark:**

- Searches that were created using a search statement number in **Advanced**History (e.g., #1 OR #2 AND human[mh]) can not be saved using the URL feature because search will be lost when History expires.

- After saving the bookmark, you may want to use your web browser's edit functions to rename the bookmark.

# My NCBI

My NCBI saves searches, results, your bibliography, and features an option to automatically update and e-mail search results from your saved searches.

My NCBI preferences includes storing and changing your e-mail address, highlighting search terms, opening the abstract display supplemental data by default, and turning off the auto suggest feature.

Additional features include filtering search results, managing recent activity, and setting a LinkOut icon, document delivery services, and outside tool preferences.

Click the My NCBI Sign In link, located at the top right of the page header, to sign into My NCBI or register for an account.

# How to Get the Journal Article

YouTube Tutorial

PubMed does not include the full text of journal articles; however, **click the icon** in the top right corner of the abstract display to link to the full text, if available.

In addition, the abstract display may include a **LinkOut – more resources** link located at the bottom of the display, with additional full text sources.

Additional tips for obtaining articles.

**Section Contents**

- Many articles are available for free.
- If you are a physician, researcher, or health professional, utilize your affiliation with a medical library or institution.
- If you are a member of the general public or not affiliated with a medical library or institution, try finding free copies, check with your local library, or go directly to the publisher.

## Free copies of some articles may be obtained in these ways:

### Free full text Filter

Use the **filter sidebar** and click the **Free full text available** link to narrow your results to resources that are available for free on the web.

### PubMed Central

Click the Abstract display “Free in PMC” icon to link to the article in PubMed Central.

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

### Free from the publisher

Click the free full text icon on the abstract format. Some publishers will provide free access to articles after you register as a guest.

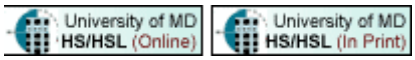
**Note**: When you click a full text icon or link in PubMed, you leave PubMed and are directed to the full text at an external provider's site. NCBI does not hold the copyright to this material, and cannot give permission for its use. Users should review all copyright restrictions set forth by the full 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 or can direct you to an interlibrary loan service.

Example library icons:




## 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 charges.

## Direct from publisher

Journal publishers or related organizations may provide access to articles for a fee or may be free after registering as an individual or guest. When available, icons to these sources can be found on the Abstract format.

Additional links to articles may be available under LinkOut on the Abstract display.

Example abstract icons:

# How to Download PubMed

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.

PubMed 2019 Baseline: ftp://ftp.ncbi.nlm.nih.gov/pubmed/baseline

PubMed 2019 Update Files: ftp://ftp.ncbi.nlm.nih.gov/pubmed/updatefiles

Terms and Conditions: ftp://ftp.ncbi.nlm.nih.gov/pubmed/baseline/README.txt

Documentation: 2019 PubMed XML Elements and Attributes

PubMed DTD: https://dtd.nlm.nih.gov/ncbi/pubmed/out/pubmed_190101.dtd

# Other Services Including the MeSH and NLM Catalog Databases

**Section Contents**

Searching by using the MeSH database

Searching for journal information in the NLM Catalog

Creating a web link to search PubMed

Using the E-utilities programming tools

Using the Batch Citation Matcher

Using Batch Entrez

## Searching by using the MeSH Database

Tutorial

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 **displayformat** 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 MeSH**

To build a PubMed search from MeSH, run a search, select terms using the check boxes, and then click "Add to search builder" in the PubMed search builder portlet. You may continue searching and including additional terms to the PubMed search builder using the "Add to search builder" and Boolean pull-down menu. 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 referenced in the NCBI Databases on the homepage of NLM Catalog or PubMed 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 programming 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.

## 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.

## Using Batch Entrez

Use Batch Entrez to upload a file of PMIDs directly to PubMed.

# Appendices

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## How PubMed works: automatic term mapping

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

### 1. MeSH translation table

The MeSH Translation Table contains:

- 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] 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].

**More information about automatic term mapping:**

- See the results **Search details** to verify how your terms are translated. 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.

### 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. Full Author translation table

The full author translation table includes full author names for articles published from 2002 forward, if available. Enter a full author name in natural or inverted order, e.g., julia s wong or wong julia s.

**More information about full author searching:**

- 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. Full Investigator (Collaborator) translation table

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

## 5. Author index

If the term is not found in the above tables, except for Full Author or Full Investigator, and is not a single term, PubMed checks the author index for a match. 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.

## 6. Investigator (Collaborator) index

If the term is not found in the above tables, except for Full Author, Author, or Full Investigator, and is not a single term, PubMed checks the investigator index for a match.

## 7. 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.

## 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.

## 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.

## 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 and display with the tag [Indexed for MEDLINE].

**In Process Citations**
PubMed's in-process records provide basic citation information and abstracts before the citations are indexed with NLM MeSH Terms and added to MEDLINE.

**Publisher-Supplied Citations**
Citations received electronically from publishers 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 [Epub ahead of print].

## 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, it is information about your interactions that may be needed later to perform a function. Cookies placed by PubMed are removed from your computer after a set time period unless you choose to use a persistent cookie with the My NCBI automatic sign in 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 and scope notes and allowable categories on the NLM website.

## MEDLINE display format

The MEDLINE Display Format tags table defines the data tags that compose the PubMed MEDLINE 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 PubMed MEDLINE format. Other tags (e.g., AU, MH, and RN) may occur multiple times in one record. This format is available for exporting citations into a citation management software program.

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

## 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.

## 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
**comma ,** - typically forces a space, e.g., a,b is translated to a, b
**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 ***
**plus symbol +**
**minus symbol -**
**period .**
**semi-colon ;**
**angle brackets < >**
**equal sign =**
**question mark ?**
**backslash **
**caret ^**
**underscore _**
**curly brackets { }**
**approximately ~**

Some characters are preserved during indexing to assist with the retrieval of substances, e.g., 1'-methyl

**single quotes ‘**

**hypens -**

## Clinical Queries Filters

Medical Genetics Filters

Systematic Reviews Search Filter

**Clinical Queries using Research Methodology Filters**

| 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]) |

The Clinical Queries search filters are based on the work of Haynes RB et al.

**Medical Genetics Search Filters**

| Category | PubMed Equivalent |
|---|---|
| Diagnosis | (Diagnosis AND Genetics) |
| Differential Diagnosis | (Differential Diagnosis[MeSH] OR Differential Diagnosis[Text Word] AND Genetics) |

*Medical Genetics Search continued from previous page.*

| | |
|---|---|
| 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)) |

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

## Algorithm for finding best matching citations in PubMed

In the standard best match order, PubMed displays documents in order of decreasing relevance score. This score is calculated by comparing the input query to the document fields (e.g. Text, Author, Journal, etc.). Document fields are indexed to allow the system to quickly retrieve the documents matching a given query. During indexing, the terms (and their frequencies) in the document are calculated and stored for each index field. During retrieval, the term frequencies are used in a weighted fashion to return a ranked list of PubMed citations matching the terms in the user query. The relevancy of a document in a single term query is dependent on the following:

- $IDF_t$ or the global weight of the term;
- $FW_f$ or the weight of the field the term appears in;
- $FL_f$ or the field length;
- $TF_t$ or the local weight of the term.

$IDF_t$ – The global weight of a term assumes that terms are independent in their contribution to finding relevant material. If term $t$ appears in $n_t$ documents and the total number of documents in the database is $N$, it will be given the global weight:

$$IDF_t = \ln\left(\frac{N - n_t + 0.5}{n_t + 0.5}\right)$$

$FW_f$ – Since the contribution of a field to the overall representation of a document is not equal, fields have weights of their own, and consequently the occurrence of a term in a particular field will have more importance than in other fields. For example, in computing the weight of a document, the occurrence of a term in the title of a document would have more importance than the occurrence of the term in the abstract field. The actual values are optimized empirically and may change over time.

$FL_f$ – For every document, a field has a different length. The sum of all field lengths of a document is equal to the document length.

$TF_t$ – The local weight of a term measures its importance in a particular document for a specific field. It is the sum of weighted frequencies of the term for all fields of a document. Generally, the more frequent a term is within a document field, the more important it is in representing the content of that document as a whole.

$$TF_t = \sum_{f \in fields} \frac{|occurrences\ of\ t\ in\ f|}{FL_f} \times FW_f$$

## Document scores

In a first pass, we generate document scores by using the local, global and field weights defined above. We calculate Okapi-BM25F [1], a field weighted version of Okapi-BM25 [2]:

$$dl = \sum_{f \in fields} FL_f \times FW_f\ ,$$
$$\widetilde{avdl} = average\ of\ dl\ across\ documents\ ,$$
$$score(d,q) = \sum_{t \in q \cap d} \frac{TF_t}{k_1\left((1-b) + b\frac{dl}{\widetilde{avdl}}\right) + TF_t} \times IDF_t\ ,$$

where $b$ and $k_1$ are free parameters, respectively set to 0.75 and 1.2 in PubMed.

## Learned ranking

The top articles returned by the weighted term frequency algorithm above are then re-ranked for better relevance by a new machine-learning algorithm. (If any technical constraints prevent the machine-learning architecture from re-ranking the results, the sort will revert to the standard best match algorithm, described above.) 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.

Formally, this training dataset contains a set of $N$ PubMed queries $Q = \{q_1, \ldots, q_N\}$, and for each query, a set of $K$ documents $D = \{d_1, \ldots, d_K\}$ associated with their gold standard relevance scores $L = \{l_1, \ldots, l_K\}$ are mined from our search logs. Each document $d_j$ is represented by a feature vector in $\mathbb{R}^{179}$ such that $d_j[v] \in \mathbb{R}$ is the $v^{th}$ feature value of the document $d_j$. In training, the goal is to find a function $F\colon \mathbb{R}^{179} \rightarrow \mathbb{R}$ that produces scores $S = \{s_1, \ldots, s_K\}$ such that when documents $D$ are ordered by these scores, the resulting ranking is the closest to the optimal ordering of $L$. We use the LambdaMART framework [3] to learn pairwise preferences over document lists. This is done by optimizing an objective function based on a ranking metric, NDCG@T [4]:

$$NDCG@T = \frac{DCG@T}{IDCG@T}\ ,$$
$$DCG@T = \sum_{t=1}^{T} \frac{2^{l(t)} - 1}{log_2(t+1)}\ ,$$

where $IDCG@T$ is the ideal $DCG@T$, that is $DCG@T$ for $L$. $T$ is the truncation rank defining the list of documents that we score. For PubMed, we optimize NDCG at $T = 20$. Say we are comparing two documents $d_j, d_k$ with relevance labels $l_j > l_k$. The objective function is defined as:

$$O_{jk} = o_{jk} + \log\left(1 + e^{o_{jk}}\right),$$

where $o_{jk} = s_j - s_k$ and $s_j, s_k$ are scores predicted by the function $F$ of the system for these documents. An approximation of the derivative of the objective function is then used to identify whether documents should be swapped to maximize the NDCG@T score:

$$\lambda_{jk} = \Delta NDCG@T(s_j, s_k) \times \frac{\partial O_{jk}}{\partial o_{jk}},$$

$$\frac{\partial O_{jk}}{\partial o_{jk}} = \frac{\partial O_{jk}}{\partial s_j} = -\frac{1}{1+e^{o_{jk}}},$$

$$\Delta NDCG@T(s_j, s_k) = N\left(2^{l_j} - 2^{l_k}\right)\left(\frac{1}{\log(1+t(d_j))} - \frac{1}{\log(1+t(d_j))}\right).$$

A gradient is then calculated for each document $d_j$ by summing the gradients associated with all pairs of documents including $d_j$:

$$\lambda_j = \sum_{l_j \neq l_k}^{k \in (d_j, d_k):} \lambda_{jk}.$$

Training consists of hundreds of iterations, and for each of them, LambdaMART builds and stores a gradient boosted tree that guides reranking by promoting or demoting documents based on the direction provided by their $\lambda$-gradient. The resulting model is thus a forest of gradient boosted trees. The machine-learning based algorithm achieves significant improvement in retrieval performance over the previous weighted term frequency algorithm.


1. Robertson, Stephen, and Hugo Zaragoza. "The probabilistic relevance framework: BM25 and beyond." Foundations and Trends® in Information Retrieval 3.4 (2009): 333-389.
2. Robertson Stephen E., et al. Okapi at TREC-3. Nist Special Publication Sp. 1995;109:109.
3. Burges, Christopher JC. "From RankNet to LambdaRank to LambdaMART: An overview." Learning 11.23-581 (2010): 81.
4. Järvelin Kalervo, Kekäläinen Jaana. Cumulated gain-based evaluation of IR techniques. ACM Transactions on Information Systems. 2002;20(4):422–446. *(TOIS)* .


## 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.

## Batch Citation Matcher Help

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

# XML Help for PubMed Data Providers

Created: February 26, 2008; Updated: June 29, 2023.

Publishers of journals in PubMed must submit citation and abstract data electronically. Electronic submissions ensure citations and abstracts are available to the public within 24 hours of uploading a properly formatted XML file and meet one of the requirements to add an icon on PubMed citations via participation in LinkOut. LinkOut allows you to link directly from a PubMed citation to the journal website.

PubMed only accepts citation and abstract data uploaded by Secure File Transfer Protocol (SFTP) in the PubMed XML tagged format. SFTP accounts are provided for publishers to send data in a confidential and reliable manner. These citations are then added to PubMed, and PubMed Unique Identifiers (PMIDs) are returned to the publisher.

Have questions about the process? Please contact the Data Provider Support Team [publisher@ncbi.nlm.nih.gov].

## General FAQs

- How can I correct errors in a citation?
- What types of articles are accepted?
- When will my citations be available?
- How do I know if my journal is in PubMed?
- What should I do if my journal title changes?

## XML Tagging

- How do I submit citation data for the first time?
- Can collaborator names be supplied to PubMed?
- How should I submit citations for errata, retractions, and comments?
- Can I submit author keywords?
- How should I submit ClinicalTrials.gov and other trial registry numbers?
- How should I submit databank accession numbers?
- Can I submit grant information?
- How do I submit reference lists?
- How should I submit citations for articles in languages other than English?
- How should I submit mathematical formulas or tables?

## File Submission

- How should filenames be constructed?
- How do I validate my files before submitting?
- How do I submit files via SFTP?
- What is the archive subdirectory for?
- How do I interpret the PubMed Loader Report?

# General FAQs

## Correcting Errors

Since the release of the PubMed Data Management System (PMDM) in October 2016, PubMed data providers are responsible for accurately presenting their own citations in PubMed. See the PMDM Quick Start Guide for details about accessing and using PMDM.

Using PMDM, data providers can update or correct nearly all elements of their citations at any time after initial receipt of the records by PubMed. There is no longer a period of time when citations are unavailable for update by the data provider.

NLM will not as a matter of course update or correct publisher-supplied citations. Instead, requests for corrections received by NLM Customer Service will be directed to the appropriate publisher for resolution however the publisher deems best and on the publisher's timeline.

Please note, NLM's Errata, Retraction, Duplicate Publication, and Comment Policy has not changed. Journals should continue to follow best practices and publish errata to correct errors appearing in the original article.

**Note:** We accept Replaces files for ahead-of-print citations and for data in the following fields regardless of the citation's status in PubMed:

- AuthorList (includes Author, Affiliation, Identifier)
- InvestigatorList (includes Investigator, Affiliation, Identifier)
- Pagination
- ELocationID
- OtherAbstract
- PII
- DOI

Our loader will compare the content of these fields in the Replaces file with the existing PubMed citation and only modify the content if it is different.

## What types of articles are accepted?

We require citations for:

- Research articles
- Editorials
- Letters to the editor on biomedical topics
- Case studies
- Errata and retraction notices
- Substantive and/or analytical reports and letters.

We do not accept citations for:

- Book reviews
- Advertisements
- Announcements
- Society news and calendars
- Software and equipment reviews
- Papers to appear in forthcoming issues
- Brief summaries of research articles

- Individual citations for brief author spotlights
- Obituaries or In Memoria
- Poetry
- Front matter and back matter, including masthead, table of contents, cover art, acknowledgements to reviewers/referees, author/subject indices
- Citations to brief CME content and CME content split into multiple citations; e.g., where Questions and Answers are submitted as separate citations.
- Individual citations for brief conference abstracts. We will accept one "overall" citation for a conference, if the article title includes the meeting name, location, and date(s).
- Peer review documents

Citations considered unacceptable will be deleted from PubMed at NLM's discretion.

### When will my citations be available?

Publisher-supplied citation data are loaded five times a day: 5am, 8:30am, 12pm, 5pm, 8pm, Monday through Saturday, and 8pm on Sunday. Loader reports are sent to data providers after each load. Citations should appear in PubMed by the next day.

### How do I know if my journal is in PubMed?

To check your journal's indexing status, search the NLM Catalog and look for the "Current Indexing Status" field.

If you cannot find your journal in the NLM Catalog or if your journal is not currently indexed for MEDLINE, then it probably needs to apply for journal selection. For more information about MEDLINE journal selection and the application process, see: https://www.nlm.nih.gov/medline/index.html

### What should I do if my journal title changes?

A change (addition, deletion, or reordering) in the first five words of a journal title is considered a title change and requires a new bibliographic record, the assignment of a new title abbreviation, and a new ISSN.

NLM requires some additional information following a change of this nature to any title indexed in MEDLINE (see the MEDLINE policy on Changes to MEDLINE Journals). Will there be additional changes to any of the following as part of the title and publisher change?

- the scope of the journal,
- the editorial board, and/or
- the journal's editorial and peer review processes.

If there is a public announcement outlining these changes, please let us know at publisher@ncbi.nlm.nih.gov. Otherwise, any details you can provide via email would be much appreciated.

## XML Tagging

### How do I submit citation data for my MEDLINE journal for the first time?

Please see the PubMed technical evaluation overview and prepare a sample file containing a citation for each indexable article in a recently published issue. When your sample file is complete and passes the Citation Validator, please email publisher@ncbi.nlm.nih.gov and we will reply with credentials for uploading the file via FTP.

## Can collaborator names be supplied to PubMed?

Yes. Investigators (also known as collaborators in PubMed) are individuals who contribute to a scientific article but are not authors. The group name author should be placed in the <Author> tags, and the investigators' names should be included by using the <IndividualName> tag within a <GroupName> tag. Please see an example of the XML tagging below:

```
<AuthorList>
<Author>
<CollectiveName>Cancer Genome Center</CollectiveName>
</Author>
<Author>
<CollectiveName>North American Barley Genome Project</CollectiveName>
</Author>
</AuthorList>
<GroupList>
<Group>
<GroupName>Cancer Genome Center</GroupName>
<IndividualName>
<FirstName>John</FirstName>
<LastName>Smith</LastName>
</IndividualName>
<IndividualName>
<FirstName>Mary</FirstName>
<LastName>Jones</LastName>
</IndividualName>
</Group>
<Group>
<GroupName>North American Barley Genome Project</GroupName>
<IndividualName>
<FirstName>John Jacob</FirstName>
<LastName>Han</LastName>
</IndividualName>
<IndividualName>
<FirstName>Laura</FirstName>
<LastName>Clancy</LastName>
</IndividualName>
</Group>
</GroupList>
```

A group name author (a collective name author, e.g., a study group name) must exist in the bibliographic citation data for investigator names to be supplied in the <GroupList> section. Investigator names should be listed in the order in which they appear in the full-text article.

For more information about NLM's policy for individual authors, group or corporate authors, and investigators, please see the Authorship in MEDLINE Fact Sheet.

## How should I submit citations for errata, retractions, and comments?

We encourage data providers to include the PMID, DOI, or PII of the original PubMed citation when submitting a citation for an erratum, retraction, comment, or other type of related article listed below. When this information is included in the XML citation data, the link between citations will display when the citation for the erratum, retraction, comment, etc., becomes available in PubMed.

The accepted related article types are:

| Object Type Value | Description |
|---|---|
| Erratum | cites the original article for which there is a published erratum. |
| Retraction | cites the article(s) being retracted. |
| Comment | cites the reference upon which the article comments. |
| republished | cites the first, originally published article. |
| Update | cites the article being updated. |
| Dataset | cites a description of a dataset. |
| Reprint | cites the first, originally published article. |
| patientsummary | cites a patient summary article. |
| originalreport | cites a scientific article associated with the patient summary. |
| ExpressionOfConcernFor | cites the original article for which there is an expression of concern |
| Retractedandrepublished | cites the first, originally published article |

Citations for errata and retractions should have the PublicationType value “Published Erratum” or “Retraction of Publication,” respectively.

Sample XML:

```
<!DOCTYPE ArticleSet PUBLIC "-//NLM//DTD PubMed 2.8//EN" "https://dtd.nlm.nih.gov/ncbi/
pubmed/in/PubMed.dtd">
<ArticleSet>
<Article>
<Journal>
<PublisherName>Public Library of Science</PublisherName>
<JournalTitle>PLoS One</JournalTitle>
<Issn>1932-6203</Issn>
<Volume>9</Volume>
<Issue>10</Issue>
<PubDate PubStatus="epublish">
<Year>2014</Year>
<Month>10</Month>
<Day>23</Day>
</PubDate>
</Journal>
<ArticleTitle>Correction: Statin Treatment in Hypercholesterolemic Men Does Not Attenuate
Angiotensin II-Induced Venoconstriction</ArticleTitle>
<FirstPage LZero="save">e112205</FirstPage>
```

```
<AuthorList>
<Author>
<CollectiveName>The PLOS ONE Staff</CollectiveName>
</Author>
</AuthorList>
<PublicationType>Published Erratum</PublicationType>
<ArticleIdList>
<ArticleId IdType="doi">10.1371/journal.pone.0112205</ArticleId>
<ArticleId IdType="pii">PONE-D-14-46356</ArticleId>
</ArticleIdList>
<Abstract>This corrects the article DOI: 10.1371/journal.pone.0103909.</Abstract>
<ObjectList>
<Object Type="Erratum">
<Param Name="type">pmid</Param>
<Param Name="id">25264877</Param>
</Object>
</ObjectList>
</Article>
</ArticleSet>
```

**Note on errata:** Beginning with the publication year 2015, NLM retains the citation for an erratum notice supplied by the publisher, assigns the Publication Type “Published Erratum,” and creates a two-way link between the citation for the erratum notice and the citation for the original article, but does not assign MeSH terms. Prior to 2015, NLM did not retain publisher-supplied errata notices.

## Can I submit author keywords?

Yes. Keyword information will be preceded by a KEYWORDS label and display below the abstract.

Keywords should be submitted in the <ObjectList> element, not as part of the abstract. Place the <ObjectList> immediately following the <Abstract>.

To submit multiple keywords, include multiple "Object" elements, one per keyword. Here is an example of the XML:

```
<ObjectList>
<Object Type=”keyword”>
<Param Name=”value”>GSH</Param>
</Object>
<Object Type=”keyword”>
<Param Name=”value”>Lipid peroxidation</Param>
</Object>
<Object Type=”keyword”>
<Param Name=”value”>MDA</Param>
</Object>
<Object Type=”keyword”>
<Param Name=”value”>Radiation</Param>
</Object>
</ObjectList>
```

## How can I submit ClinicalTrials.gov and other registry numbers?

Use the ObjectList, Object, and Param tags to supply clinical trial registry numbers. Following are sample XML fragments illustrating the tagging format for various registries:

```
<ObjectList>
<Object Type="ClinicalTrials.gov">
<Param Name="id">NCT00000125</Param>
```

```
</Object>
</ObjectList>
<ObjectList>
<Object Type="ANZCTR">
<Param Name="id">ACTRN12614000771651</Param>
</Object>
</ObjectList>
<ObjectList>
<Object Type="UMINCTR">
<Param Name="id">UMIN000021932</Param>
</Object>
</ObjectList>
```

## How can I submit databank accession numbers?

Use the ObjectList, Object, and Param tags to supply databank accession numbers. Following are sample XML fragments illustrating the tagging format for various databanks:

```
<ObjectList>
<Object Type="figshare">
<Param Name="id">10.6084/M9.FIGSHARE.1004150</Param>
</Object>
</ObjectList>
<ObjectList>
<Object Type="Dryad">
<Param Name="id">10.5061/dryad.2f050</Param>
</Object>
</ObjectList>
<ObjectList>
<Object Type="UniProtKB">
<Param Name="id">Q9H040</Param>
</Object>
</ObjectList>
<ObjectList>
<Object Type="NCBI:pubchem-substance">
<Param Name="id">251912582</Param>
</Object>
</ObjectList>
<ObjectList>
<Object Type="BioProject">
<Param Name="id">PRJNA178613</Param>
</Object>
</ObjectList>
```

## Can I submit grant information?

Yes. The grants should be provided in the <ObjectList> as follows:

```
<ObjectList>
<Object Type="grant">
<Param Name="id">12345</Param>
<Param Name="grantor">Wellcome Trust</Param>
</Object>
</ObjectList>
```

Please see Grant Number Information Found in the GR Field in MEDLINE/PubMed for a list of grantor names. In the <Param Name="grantor"> element, supply the complete name from the “Full Institution/Organization Name” or “Name” column, for example:

```
<ObjectList>
<Object Type="grant">
<Param Name="id">12345</Param>
<Param Name="grantor">Motor Neurone Disease Association</Param>
</Object>
<Object Type="grant">
<Param Name="id">78901</Param>
<Param Name="grantor">National Aeronautics and Space Administration, Intramural</Param>
</Object>
<Object Type="grant">
<Param Name="id">R01 aa123456</Param>
<Param Name="grantor">National Institute on Alcohol Abuse and Alcoholism</Param>
</Object>
</ObjectList>
```

When you supply a grantor name exactly as it appears on the provided list, we will automatically display the appropriate country on the citation in PubMed. You may supply grants that do not appear on the list; however, we will not append the country name for other organizations.

For organizations that do not appear on the controlled list, you may choose to include the acronym and country in your XML submission, for example:

```
<ObjectList>
<Object Type="grant">
<Param Name="id">12345</Param>
<Param Name="grantor">National Health and Medical Research Council</Param>
<Param Name="acronym">NHMRC</Param>
<Param Name="country">Australia</Param>
</Object>
</ObjectList>
```

## How do I submit reference lists?

We encourage publishers to include reference lists using the <ReferenceList> element. There can be multiple references lists and the lists can be nested. This structure accommodates reference lists with distinctly labeled sections (for example, references to articles cited followed by references to datasets). The XML tagging should reflect the way that the reference list is presented in the published journal article.

The other tags used are <Title>, <Reference>, <Citation>, <PMID>, and <ArticleIdList>.

Each parent or child reference list can include an optional title. The reference itself is comprised of either a citation string, or a PMID for a citation in PubMed. We recommend including any article identifiers associated with the cited item.

Please note that the citation display in PubMed already includes the section heading "References." Please avoid submitting a reference list with a top-level heading <Title>References</Title> since this will create a redundant heading. The <Title> element within a reference list should describe a section within a references list, as in the second example, below.

```
<ReferenceList>
<Reference>
<Citation>Hall KK, Lyman JA. Updated review of blood culture contamination. Clin
Microbiol Rev. 2006;19:788&#8211;802.</Citation>
<ArticleIdList>
<ArticleId IdType="pmcid">PMC1592696</ArticleId>
<ArticleId IdType="pubmed">17041144</ArticleId>
</ArticleIdList>
</Reference>
```

```
<Reference>
<Citation>Hall MJ, Williams SN, Defrances CJ, Golosinskiy A. Inpatient care for
septicemia or sepsis: a challenge for patients and hospitals. NCHS Data Brief.
2011:1&#8211;8.</Citation>
<ArticleIdList>
<ArticleId IdType="pubmed">22142805</ArticleId>
</ArticleIdList>
</Reference>
</ReferenceList>

<ReferenceList>
<Title>Appendix B. LMBP blood culture contamination studies</Title>
<ReferenceList>
<Title>Included studies</Title>
<Reference>
<Citation>Beutz M, Sherman G, Mayfield J, Fraser VJ, Kollef MH. Clinical utility of blood
cultures drawn from central vein catheters and peripheral venipuncture in critically ill
medical patients. Chest. 2003;123:854&#8211;61.</Citation>
<ArticleIdList>
<ArticleId IdType="pubmed">12628888</ArticleId>
<ArticleId IdType="pii">S0012-3692(16)34755-9</ArticleId>
</ArticleIdList>
</Reference>
<Reference>
<Citation>Everts RJ, Vinson EN, Adholla PO, Reller LB. Contamination of catheter-drawn
blood cultures. Journal of Clinical Microbiology. 2001;39:3393&#8211;4.</Citation>
<ArticleIdList>
<ArticleId IdType="pmcid">PMC88356</ArticleId>
<ArticleId IdType="pubmed">11526188</ArticleId>
</ArticleIdList>
</Reference>
</ReferenceList>
<ReferenceList>
<Title>Excluded studies</Title>
<Reference>
<Citation>Gonsalves WI, Cornish N, Moore M, Chen A, Varman M. Effects of volume and site
of blood draw on blood culture results. Journal of Clinical Microbiology.
2009;47:3482&#8211;5.</Citation>
</Reference>
</ReferenceList>
</ReferenceList>

<ReferenceList>
<Reference>
<PMID>17041144</PMID>
<ArticleIdList>
<ArticleId IdType="pmcid">PMC1592696</ArticleId>
<ArticleId IdType="pubmed">17041144</ArticleId>
<ArticleId IdType="pii"> 19/4/788</ArticleId>
<ArticleId IdType="doi">10.1128/CMR.00062-05</ArticleId>
</ArticleIdList>
</Reference>
<Reference>
<PMID>22142805</PMID>
<ArticleIdList>
<ArticleId IdType="pubmed">22142805</ArticleId>
</ArticleIdList>
</Reference>
</ReferenceList>
```

## How should I submit mathematical formulas or tables?

**Formulas:**

PubMed accepts MathML 3.0 tagging for any formulas in the Article Title, Abstract, Other Abstract and Keyword fields.

**Simple formulas:**

Simple formulas, e.g., $x^2$, may be submitted with Unicode character encoding. Please refer to the PubMed Special Character Set for preferred encodings for common special characters. XML submissions may also include <sup>, <sub>, <b>, <i>, and <u>.

**Tables:**

Submit the following in place of complex tables within abstracts: [Table: see text]

# File Submission

## How should filenames be constructed?

File names should be unique. We do not require a specific naming convention but suggest you include journal title abbreviation, volume, and issue, e.g., AJPv36i12.xml. The file name should not contain any spaces or UTF-8 character symbols (e.g. the letter a with an acute symbol) and not exceed 32 characters. We prefer files to be submitted in plain ASCII text format. However, we can accept the compressed file formats .tar, .zip, and .gz

## How do I validate my files before submitting?

Use the PubMed Citation File Validator to validate your XML file before uploading it. Please refer to the Citation File Validator help for more information.

## How do I submit files via SFTP?

From a standard SFTP client:

1. At a command prompt type: **sftp-private.ncbi.nlm.nih.gov** and press **enter**.
2. Type your **username** at the login prompt and press **enter**. (Use your existing FTP username and password. Contact us if you've never had a private FTP/SFTP account.)
3. Type your **password** at the password prompt and press **enter**.

You should now be logged into the SFTP server. If you receive an error message, check your login information, type "**bye**" followed by **enter**, and retry steps **1-3.**

4. Type "**bin**" and press **enter**. This changes your SFTP server to **BINARY** mode.

5. Type the "**put**" command, followed by your pathname or drive and filename and press **enter**. (For example, "**put C:\filename**" or "**put /home/testfiles/journalv6n3**".)

6. Type "**dir**" and press enter to display the files in your SFTP directory.

7. Type "**bye**" to disconnect from the server and close the SFTP session.

Notes:

- When using SFTP, you must connect with Port 22.

- It is possible that the SFTP client will support "drag and drop" functionality for uploading files. See the product documentation for instructions.
- You will see an 'archive' folder in your directory. DO NOT put files in the 'archive' folder! Files will automatically be placed there after processing.

To upload files from a browser window, using FTP rather than SFTP:

1. In the URL address box type in: **ftp://ftp-private.ncbi.nlm.nih.gov** and press **enter**.
2. From the **File** pull-down menu, choose "**Login As**".
   a If you are using Internet Explorer 7 then click on **Page** and choose "Open FTP Site in Windows Explorer". In the new window go to the **File** pull-down menu, choose "**Login As**".
3. Type in your **username and password** in the dialog box. The screen will display your directory with an 'archive' folder inside.
4. Add new files here at the **top level of the directory**. You will see an 'archive' folder in your directory. DO NOT put files in the 'archive' folder! They will automatically be placed there after processing.

## What is the archive subdirectory for?

Files are stored in the 'archive' subdirectory after they have been loaded into PubMed. Do **not** place citation files in the 'archive' subdirectory. Files placed in the 'archive' subdirectory will not be loaded.

## How do I interpret the PubMed Loader Report?

Rejected articles in a Loader Report will often be annotated with error messages. Here is a list of possible error messages:

**Cannot replace Article: Article does not have "[PubMed – as supplied by publisher]" status.** The <Replaces> tag can only be used if the citation is ahead of print and to update a limited set of fields. Please see Correcting Errors in PubMed for more information.

**Cannot find article by ID.** The DOI or PII listed in the <Replaces> tag IdType attribute does not exist in a PubMed citation. Please verify that the DOI or PII is accurate. If necessary, remove the <Replaces> tag and reload the file to create the article rather than 'replace' a non-existent PubMed citation.

**Article matches PMID = , which is not in " [PubMed – as supplied by publisher] " status.** This message means the data is already in PubMed and cannot be modified by a Replacement file.

**ISSN not found in NCBI database: ISSN= Title= .** There are two actions you can take in response to this: 1) Verify the ISSN is correct; 2) Confirm that you have notified the Data Provider Support Team of any recent title changes.

**Not a current MEDLINE journal: ISSN= Title= .** There are two actions you can take in response to this: 1) Verify the ISSN is correct; 2) Confirm that you have notified the Data Provider Support Team of any recent title changes.

**Article matches PMID= To update use <Replaces> tag.** Please refer to Instructions for Replacement Files for more information.

**Cannot replace Article: PMID does not exist**. NLM has deleted the PMID or you have provided an invalid PMID.

**Wrong provider.** Verify that you have received Approval from the Data Provider Support Team.

**Partial match.** Submitted citation matched an existing PubMed citation. Volume, issue, page and Article Id matched but there are differences in the author, title, or publication date tags.

**Invalid Year / Invalid Month / Invalid Day.** The message will specify whether the invalid date appeared in the PubDate tag within <Journal> or the PubDate tag within <History>. <Year> can only contain a 4-digit number between 1966 and the current year. <Month> can only contain the numbers 1-12, the month (in English) or the first three letters of the English months. NOTE: The only PubStatus attribute that allows for a dual month in <Month> is ppublish. <Day> can only contain the numbers 1-31.

**Month tag is missing or empty; Day tag is present.** The <Month> tag is required if the <Day> tag is present.

**ISSN tag is missing or empty.** The <Issn> tag is required.

**Both Volume and Issue tags are missing or empty.** A valid file must contain a value in the <Volume> tag or the <Issue> tag, or both.

**Replaces tag has invalid symbols or is empty.** <Replaces> tag cannot be empty. Please refer to the Instructions for Replacement Files for more information.

**FirstPage tag is missing or empty.** In a <PubDate PubStatus ="ppublish" article the <FirstPage> tag cannot be empty.

**FirstPage tag is missing or empty; LastPage is present.** If an article is only one page in length the value should appear in the <FirstPage> tag not the <LastPage> tag.

**FirstPage / LastPage tag has invalid symbols.** Allowed characters for pagination are: digits, letters, semicolon, and period. Hyphen is not allowed.

**Unknown Language.** See our list of accepted language codes (Table 1).

**FirstName / LastName / CollectiveName tag is missing or empty.** Message will specify which Author tag the error occurred in. (Author 1, Author 2, etc.) If either the <FirstName> or <LastName> tag is present and contains text both must be present and contain text. If neither the <FirstName> nor <LastName> tag is present then the <CollectiveName> tag must be present and contain text.

**FirstName / LastName contains invalid characters.** Message will specify which <Author> tag the error occurred in. (Author 1, Author 2, etc.). The following are invalid characters:

! " # $ % & @ ( ) * + / ; : ` < = > ? ^ { | } [ \ ]

**Ahead-of-print Article must have "pii" or "doi".** See All About Ahead of Print for more details

**Invalid Ahead of Print date.** Ahead of Print files cannot have an electronic publication date greater than eighteen (18) months prior to the date of uploading to PubMed.

**Cannot replace Article: Replacement file must use the original ArticleIds.** ArticleIds must match exactly.

**Cannot replace Article: ArticleIds do not match. Contact LinkOut to change ArticleIds.** ArticleIds must match exactly.

**Bibliographic data does not match.**

**Non-indexable content:** the citation was identified as being content not indexed for MEDLINE.

**Cannot resolve article id.** This error occurs when submitting a citation for an erratum or retraction notice, and our loader cannot find the DOI in the ArticleId element of a PubMed citation. Try using the PMID instead, e.g., <Param Name="type">pmid</Param>.

Files may also be rejected due to **DTD validation errors**. Some common errors are:

- The presence of an incomplete entity. All entities must begin with an ampersand (&) and end with a semi-colon (;).
- The presence of a stand-alone ampersand (&). When an ampersand is not part of an entity it must be represented by this entity: &
- The presence of a stand-alone less than (<) or greater than (>) symbol. When less than or greater than symbols are not part of XML tags they must be represented by the entities < and > respectively.
- The presence of extraneous spaces and/or line breaks within XML tags.
- The file or an article within the file was not formatted in accordance with PubMed specifications. Additional information on the required XML format is available in the PubMed DTD.

**Table 1:** The following is a subset of the ISO 639 standard for language codes.

| CODE | LANGUAGE |
|---|---|
| EN | English |
| AF | Afrikaans |
| SQ | Albanian |
| AM | Amharic |
| AR | Arabic |
| AZ | Azerbaijani |
| HY | Armenian |
| BN | Bengali |
| BS | Bosnian |
| BG | Bulgarian |
| CA | Catalan |
| ZH | Chinese |
| HR | Croatian |
| CS | Czech |
| DA | Danish |
| NL | Dutch |
| EO | Esperanto |
| ET | Estonian |
| FI | Finnish |
| FR | French |
| GD | Scottish Gaelic |
| KA | Georgian |
| DE | German |
| EL | Greek, Modern |
| HE | Hebrew |
| HU | Hungarian |
| HI | Hindi |
| IS | Icelandic |
| ID | Indonesian |

*Table 1 continued from previous page.*

| CODE | LANGUAGE |
|---|---|
| IT | Italian |
| JA | Japanese |
| RW | Kinyarwanda |
| KO | Korean |
| LA | Latin |
| LV | Latvian |
| LT | Lithuanian |
| MK | Macedonian |
| ML | Malayalam |
| MI | Maori |
| MS | Malay |
| MU | Multilingual |
| NO | Norwegian |
| FA | Persian |
| PL | Polish |
| PT | Portuguese |
| PS | Pushto |
| RO | Romanian |
| RU | Russian |
| SA | Sanskrit |
| SR | Serbo-Croatian, Cyrillic |
| SR | Serbo-Croatian, Roman |
| SK | Slovak |
| SL | Slovene |
| ES | Spanish |
| SV | Swedish |
| TH | Thai |
| TR | Turkish |
| UK | Ukrainian |
| UR | Urdu |
| VI | Vietnamese |
| CY | Welsh |

# PubMed XML Tagged Format

The XML tags are listed below followed by descriptions. This format is required for submission of citation and abstract data to PubMed. Only citations published in journals that are already approved for inclusion in PubMed should be submitted.

We encourage data providers to submit citation data in UTF-8 character encoding. For any special characters, we recommend referencing the PubMed Special Character Set to ensure that the appropriate encoding is used.

**Section Contents**


- XML Tag Descriptions
- XML File Examples
- Subset of ISO 639 Language Codes (Table 1)
- PubMed DTD


# XML Tag Descriptions

The following is a glossary of the tags defined in the PubMed DTD. Click on each of the tag names below for more information. You can also view an Example of a Standard XML File.

Data Tags (**R** = Required, **O** = Optional **O/R** = Optional or Required). Tag names are **case sensitive**. Required tags must be included; optional tags must be included if the data requested appears in the print or electronic article. Optional or Required tags are dependent on the use of other tags.

The citation XML supplied to NLM must match the published article version of record. Please include the tags below if the corresponding data exists in the published article.

| | | |
|---|---|---|
| File Header (R) | FirstPage (O/R) | PublicationType (O) |
| ArticleSet (R) | LastPage (O) | ArticleIdList (O/R) |
| Article (R) | ELocationID (O/R) | ArticleId (R) |
| Journal (R) | Language (O) | History (O) |
| PublisherName (R) | AuthorList (O/R) | Abstract (O) |
| JournalTitle (R) | Author (R) | OtherAbstract (O) |
| Issn (R) | FirstName (O/R) | CopyrightInformation (O) |
| Volume (O/R) | MiddleName (O) | CoiStatement (O) |
| Issue (O/R) | LastName (O/R) | ObjectList (O) |
| PubDate (R) | Suffix (O) | Object (O) |
| Year (R) | CollectiveName (O) | Param (O) |
| Month (O/R) | Affiliation (O) | ReferenceList (O) |
| Season (O) | Identifier (O) | Title (O) |
| Day (O) | GroupList (O/R) | Reference (O/R) |
| Replaces (O) | Group (R) | Citation (O/R) |
| ArticleTitle (O) | GroupName (R) | PMID (O/R) |
| VernacularTitle (O) | IndividualName (O) | |

## File Header (R)

The file header is the first line of the XML file that tells us the DTD information. It must appear in the PubMed XML files exactly as:

```
<!DOCTYPE ArticleSet PUBLIC "-//NLM//DTD PubMed 2.8//EN"
"https://dtd.nlm.nih.gov/ncbi/pubmed/in/PubMed.dtd">
```

You will be notified if this header changes.

## ArticleSet (R)

This tag should enclose an entire set of articles in an issue or volume of a given journal.

## Article (R)

Each article must be enclosed in these tags.

## Journal (R)

Information about the journal issue is contained within this tag in the file.

## PublisherName (R)

The publisher name.

## JournalTitle (R)

The NLM Title Abbreviation for the journal. If you do not know the abbreviation, see the NLM Catalog.

## Issn (R)

The ISSN or ESSN of the journal. An ESSN can be supplied if it exists in the journal's NLM Catalog record. If you do not see the ESSN number in the Catalog, please write to publisher@ncbi.nlm.nih.gov, and we will have the number added to our records. Note that the ESSN must be a registered number.

## Volume (O/R)

The volume name or number of the journal, including any supplement information, e.g., 12 Suppl 2, 514 (Pt 2), 19 Suppl A, etc. This tag is **Required** if the Issue tag is **not** present.

## Issue (O/R)

The issue number, e.g., 4 Suppl 2, 6 Pt 2, 7-8, etc. This tag is **Required** if the Volume tag is **not** present.

## PubDate (R)

The publication date information must be enclosed in the following tags. NOTE: Print or Electronic publication dates should **accurately reflect the date format on the article.** The PubDate tag includes the **PubStatus** attribute, which may contain **only** one of the following values:

- **ppublish** - print-format (default value). With this value the PubDate must contain a Year tag and it could also contain a Month, Season, and/or Day tag. The tags used depend on how the date appears on the article.
- **epublish** - electronic-format. With this value the PubDate must contain a Year, Month, and Day tag that gives the exact date the article was publicly available in the final version.
- **aheadofprint** - electronic-format without final citation information; to be followed later by a version with final citation information. With this value the PubDate must contain a Year, Month, and Day tag that gives the exact date the article was first made publicly available. This PubStatus value plays an important part in the process of submitting Ahead of Print citations.

If the PubStatus attribute is not present it will default to ppublish.

Citations with PubStatus="epublish" or PubStatus="aheadofprint" can only be submitted for publication date years greater than or equal to 2000.

## Year (R)

The 4-digit year of publication. This tag must only contain a 4-digit year greater than or equal to 1966.

## Month (O/R)

The month of publication. This tag may only contain the numbers 1-12, the month (in English) or the first three letters of the English months. NOTE: The only PubStatus attribute that allows for a dual month in <Month> is ppublish. This tag is **Required** if the Day tag is present.

## Season (O)

The season of publication. e.g.,Winter, Spring, Summer, Fall. Do **not** use if a Month is available.

## Day (O)

The day of publication. This tag may only contain the numbers 1-31.

## Replaces (O)

The identifier of the article to be replaced. **Do not use this tag for new articles.** The <Replaces> tag can be used to update an Ahead of Print citation, or to correct an error. The Replaces tag includes the **IdType** attribute, which may contain **only** one of the following values:

- **pubmed** - PubMed Unique Identifier (PMID) (default value)
- **pii** - publisher identifier
- **doi** - Digital Object Identifier

See our Instructions for Replacement Files for more details.

## ArticleTitle (O)

The article title, in English, if published in English or translated to English in the journal. Do not submit this tag if the published title is not in English or is not translated to English in the journal. See VernacularTitle.

## VernacularTitle (O)

The article title in the original language, if not in English. Used only for Latin based alphabets. See our Instructions for Non-English Languages.

## FirstPage (O/R)

The first page on which the article appears. If an article appears in more than one language with consecutive pagination, pagination should be inclusive of all texts. This tag is **Required** if ELocationID is **not** present.

## LastPage (O)

The last page on which the article appears. If an article appears on one page, this is the same as FirstPage. If an article appears on non-consecutive pages this tag should still contain the last page on which the article appears. If an article appears in more than one language in the same issue, pagination should be inclusive of all texts.

## ELocationID (O/R)

The Electronic Location Identifier is used when an article does not have a FirstPage value OR to include the online location of the article. This tag is **Required** if FirstPage is **not** present. The ELocationID tag includes the **EIdType** attribute, which may contain only one of the following values:

- **pii** - publisher identifier
- **doi** - Digital Object Identifier

The DOI will be displayed on the citation, alongside the journal, issue, and pagination information, and it should be supplied in the standard format, e.g., 10.xxx/xxx. Do not include any leading characters like "doi:" or submit the DOI as a URL.

## Language (O)

The language in which the article is published. This should be chosen from the language codes (Table 1) in ISO 639. If unspecified, EN (English) is assumed. If an article appears in more than one language in the same issue, submit multiple language tags listed in the order in which the texts appear in the journal, not in the alphabetical order of the symbols. If one of the languages is English, enter EN first. See our Instructions for Non-English Languages.

## AuthorList (O/R)

The author information must be enclosed in these tags. If an article has one or more authors, this tag must be submitted. Authors should be listed in the same order as in the article, and the author name format should accurately reflect the article. **Do not use all upper case letters.** This tag is **Required** if the Author tag is present.

## Author (R)

Information about a single Author must begin with this tag.

Use the **EqualContrib** attribute value "Y" to indicate equal contribution among authors. In the example below, the first two authors contributed equally.

```
<AuthorList>
<Author EqualContrib="Y">
<FirstName>Katherine</FirstName>
<LastName>Anderson</LastName>
<AffiliationInfo>
<Affiliation>Georgetown University</Affiliation>
</AffiliationInfo>
</Author>
<Author EqualContrib="Y">
<FirstName>Edward</FirstName>
<LastName>Scarborough</LastName>
<AffiliationInfo>
<Affiliation>Mayo Clinic</Affiliation>
</AffiliationInfo>
</Author>
<Author>
<FirstName>Joanna</FirstName>
<LastName>Kay</LastName>
<AffiliationInfo>
<Affiliation>Georgetown University</Affiliation>
</AffiliationInfo>
</Author>
</AuthorList>
```

## FirstName (O/R)

The Author's full first name is required if it appears in the print or online version of the journal. First initial is acceptable if full name is not available. This tag is **Required** if the LastName tag is present.

If an author has only one name, use the **EmptyYN** attribute value "Y." Here is an example:

```
<AuthorList>
<Author>
<FirstName EmptyYN="Y"></FirstName>
<MiddleName></MiddleName>
<LastName>Matiullah</LastName>
</Author>
</AuthorList>
```

## MiddleName (O)

The Author's full middle name, or initial if the full name is not available. Multiple names are allowed in this tag.

## LastName (O/R)

The Author's last name. This tag is **Required** if the FirstName tag is present.

## Suffix (O)

The Author's suffix, if any, e.g. "Jr", "Sr", "II", "IV". Do **not** include honorific titles, e.g. "M.D.", "Ph.D.".

## CollectiveName (O)

The name of the authoring committee or organization. The CollectiveName tag should be placed within an Author tag. Omit extraneous text like, "on behalf of."

Please see the following example:

```
<AuthorList>
<Author>
<CollectiveName>Plastic Surgery Educational Foundation DATA Committee</CollectiveName>
</Author>
</AuthorList>
```

## Affiliation (O)

The institution(s) that the author is affiliated with. Submit affiliations for each author, collaborator, and corporate author published in the article. Include the following data, if available: division of the institution, institution name, city, state, postal or zip code, country, e-mail address. Do not include the word 'e-mail'.

We accept multiple affiliations per author. Please see the following example:

```
<Author>
<FirstName>Frank</FirstName
<LastName>Davis</LastName>
<AffiliationInfo>
<Affiliation>Department of Human Genetics, University of California, Los Angeles,
California 90095, USA</Affiliation>
</AffiliationInfo>
<AffiliationInfo>
<Affiliation>Lewis Sigler Institute for Integrative Genomics, Princeton University,
Princeton, New Jersey, 08544, USA</Affiliation>
</AffiliationInfo>
</Author>
```

## Identifier (O)

An author (personal or collective) or investigator's author ID. The value in the Identifier attribute Source designates the organizational authority that established the unique identifier, e.g., ORCID. Please submit ORCID in the format: XXXX-XXXX-XXXX-XXXX.

## GroupList (O/R)

Group information should be enclosed in these tags. If an article has one or more Groups, this tag must be submitted. Groups should be listed in the same order as in the printed article, and Group name format should accurately reflect the article. This tag is **Required** if the tag Group is present.

## Group (R)

Information about a single Group must begin with this tag.

## GroupName (R)

The name of the authoring committee or organization. Omit extraneous text like, "on behalf of."

## IndividualName (O)

The name of individual members belonging to the authoring committee or organization. The name should be tagged with the FirstName, MiddleName, LastName, Suffix, and Affiliation tags.

## PublicationType (O)

Used to identify the type of article. The available PublicationTypes are:

- Address
- Bibliography
- Case Reports
- Classical Article
- Clinical Conference
- Clinical Trial
- Congress
- Consensus Development Conference
- Consensus Development Conference, NIH
- Corrected and Republished Article
- Editorial
- Expression of Concern
- Festschrift
- Guideline
- Interview
- Journal Article
- Lecture
- Letter
- Meta-Analysis
- News
- Newspaper Article
- Observational Study
- Patient Education Handout
- Practice Guideline
- Published Erratum
- Retraction of Publication
- Review
- Systematic Review
- Video-Audio Media
- Webcast

The default value, Journal Article, will be added to citations if this tag is left blank or an invalid PublicationType is used. We encourage you to select the most appropriate PT from this list to submit with a citation. It is seldom necessary to provide more than one PT.

## ArticleIdList (O/R)

The list of Article Identifiers. This tag is **Required** if ArticleId is present.

## ArticleId (R)

The Article Identifier. The ArticleId tag includes the **IdType** attribute, which may include **only** one of the following values for each identifier:

- **pii** - publisher identifier (default value)
- **doi** - Digital Object Identifier

DOI in ArticleId is used to generate LinkOut links to the full-text and will also display at bottom of the PubMed citation.

DOI should be supplied in the standard format, e.g., 10.xxx/xxx. Do not include any leading characters like "doi:" or submit the DOI as a URL.

## History (O)

The history of a publication (e.g., received, accepted, revised, published, ahead of print). Publishers may supply PubDates and PubStatus in History using the PubDate format detailed above. History PubDate is optional; however the PubDate within Journal, outlined above, is required. The History PubDate tag includes the **PubStatus** attribute, which may contain **only** one of the following values for each date in the publication history:

- **received** - date manuscript received for review
- **accepted** - accepted for publication
- **revised** - article revised by publisher or author
- **aheadofprint** - published electronically prior to final publication
- **epublish** – published electronically
- **ppublish** – published in print
- **ecollection** – used for electronic-only journals that publish individual articles and later collect them into an "issue" date, typically called an eCollection.

Any PubDate in History must be **an exact PubDate**, one that includes valid values in the <Year>, <Month> and <Day> tags.

The <History> tag plays an important part in the process of submitting Replacement Files for Ahead of Print citations. If a citation is submitted using the "aheadofprint" attribute in the <PubDate> tag and is later replaced using the "ppublish" attribute, we recommend that the publisher "move" the Ahead of Print date to the <History> tag in the Replacement File. This will enable the citation to retain the ahead of print publish date in PubMed. For more details, see All About Ahead of Print.

## Abstract (O)

The article's abstract. Include all text as a single ASCII paragraph.

Headings of structured abstracts, e.g., OBJECTIVE, DESIGN, etc. should be capitalized and end with a colon, followed by a space before the text, or tagged with the AbstractText element. **Do not include citation information in the Abstract tag**.

## AbstractText (O)

This element can be used to submit structured abstract section headings. It can be placed within the Abstract or OtherAbstract elements and should have a Label attribute containing the structured abstract section heading.

Here is an example of a structured abstract using the AbstractText element:

```
<Abstract>
<AbstractText Label="OBJECTIVE">To assess the effects...</AbstractText>
<AbstractText Label="METHODS">Patients attending lung...</AbstractText>
<AbstractText Label="RESULTS">Twenty-five patients...</AbstractText>
<AbstractText Label="CONCLUSIONS">The findings suggest...</AbstractText>
</Abstract>
```

## OtherAbstract (O)

This tag can contain the article's non-English abstract. OtherAbstract has a Language attribute, which should contain the two- or three-letter code (Table 1) for the language of the abstract, e.g., <OtherAbstract Language="fr">.

OtherAbstract can also contain a plain language summary if the Type attribute is plain-language-summary.

```
<OtherAbstract Language="eng" Type="plain-language-summary">In patients with type 2
diabetes, blood sugar levels are higher and vary more than in healthy people. In the
past, some drugs that were used to treat diabetes by controlling blood sugar levels
increased the risk of certain complications. </OtherAbstract>
```

## CopyrightInformation (O)

The Copyright information associated with this article.

## CoiStatement (O)

The Conflict of Interest statement associated with this article.

## ObjectList (O)

This tag contains a list of <Object>s and <Param>s.

## Object (O)

The Object tag includes the **Type** attribute, which may include **only** one of the following values for each identifier.

- Keyword
- Grant
- Comment
- Dataset
- Erratum
- Originalreport
- Partialretraction
- Patientsummary
- Reprint
- Republished
- Retraction
- Update

Allowed **Type** attribute values for clinical trial registries (sample XML is available here):

- ANZCTR
- ClinicalTrials.gov
- CRiS
- CTRI
- ChiCTR
- DRKS
- EudraCT
- IRCT
- JMACCT
- JPRN
- NTR
- PACTR
- RPCEC
- SLCTR
- ReBec
- TCTR

- ISRCTN
- JapicCTI
- UMINCTR

Allowed **Type** attribute values for databanks (sample XML is available here):

- BioProject
- Dryad
- figshare
- GDB
- Omim
- PDB
- PIR
- SwissProt
- UniMES
- UniParc
- UniProtKB
- UniRef
- NCBI:dbgap
- NCBI:dbvar
- NCBI:genbank
- NCBI:genome
- NCBI:gensat
- NCBI:geo
- NCBI:homologene
- NCBI:nucleotide
- NCBI:popset
- NCBI:protein
- NCBI:pubchem-bioassay
- NCBI:pubchem-compound
- NCBI:pubchem-substance
- NCBI:refseq
- NCBI:snp
- NCBI:sra
- NCBI:structure
- NCBI:taxonomy
- NCBI:unigene
- NCBI:unists

## Param (O)

The Param tag includes the **Name** attribute; the allowed values for **Name** will depend on the Object Type. Please see the example markup for errata and other linked citations, author keywords, trial registries, databanks, and grants.

## ReferenceList (O)

Each ReferenceList element contains a reference list. There can be multiple references lists and the lists can be nested. The ReferenceList tag is both a parent and child element. For tagging instructions, see How do I submit reference lists?

## Title (O)

This element is used to include the title for a reference list.

## Reference (O/R)

The Reference element contains one reference within a reference list. This element is required if the <ReferenceList> tag is present.

## Citation (O/R)

The Citation element is used to provide the entire citation string for a reference within a reference list. This element is required if the Reference element is present and the PMID element is not being used to create the reference.

## PMID (O/R)

The PMID element is used to provide the PMID for a reference within a reference list. This element is required if the Reference element is present and the Citation element is not being used to create the reference.

# Example of a Standard XML file

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pubmed/in/PubMed.dtd">
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       <JournalTitle>Int J Chron Obstruct Pulmon Dis</JournalTitle>
       <Issn>1178-2005</Issn>
       <Volume>12</Volume>
       <Issue>3</Issue>
       <PubDate PubStatus="ppublish">
       <Year>2017</Year>
       <Month>03</Month>
       </PubDate>
     </Journal>
     <ArticleTitle>A case series of an off-the-shelf online health
     resource with integrated nurse coaching to support self-management
     in COPD.</ArticleTitle>
     <FirstPage>2955</FirstPage>
     <LastPage>2967</LastPage>
     <ELocationID EIdType="doi">10.2147/COPD.S139532</ELocationID>
     <Language>EN</Language>
     <AuthorList>
       <Author>
         <FirstName>Frances</FirstName>
         <LastName>Early</LastName>
         <Affiliation>Centre for Self Management Support, Cambridge
         University Hospitals NHS Foundation Trust, Cambridge, UK.
         </Affiliation>
       </Author>
       <Author>
         <FirstName>Jane</FirstName>
         <MiddleName>S</MiddleName>
         <LastName>Young</LastName>
         <Affiliation>Faculty of Health, Social Care and Education,
         School of Nursing and Midwifery,Anglia Ruskin University,
         Cambridge, UK.
         </Affiliation>
       </Author>
       <Author>
         <FirstName>Elizabeth</FirstName>
         <LastName>Robinshaw</LastName>
         <AffiliationInfo>
         <Affiliation>Gloucestershire Hospitals NHS Foundation Trust,
         Gloucester, UK.</Affiliation>
         </AffiliationInfo>
         <AffiliationInfo>
         <Affiliation> Faculty of Health, Social Care and Education,
         School of Nursing and Midwifery,Anglia Ruskin University,
         Cambridge, UK.</Affiliation>
         </AffiliationInfo>
```

```
      <Identifier Source="ORCID">0000-0001-6439-7613</Identifier>
    </Author>
    <Author>
      <FirstName>Ella Z</FirstName>
      <LastName>Mi</LastName>
      <Affiliation>School of Clinical Medicine, University of
      Cambridge, Cambridge, UK.</Affiliation>
    </Author>
    <Author>
      <FirstName>Jonathan P</FirstName>
      <LastName>Fuld</LastName>
      <Affiliation>Centre for Self Management Support, Cambridge
      University Hospitals NHS Foundation Trust, Cambridge, UK.
      </Affiliation>
    </Author>
  </AuthorList>
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      <Month>09</Month>
      <Day>30</Day>
    </PubDate>
    <PubDate PubStatus="accepted">
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      <Month>10</Month>
      <Day>14</Day>
    </PubDate>
    <PubDate PubStatus="aheadofprint">
      <Year>2015</Year>
      <Month>01</Month>
      <Day>17</Day>
    </PubDate>
  </History>
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    <AbstractText Label="BACKGROUND">COPD has significant
    psychosocial impact. Self-management support improves quality of
    life, but programs are not universally available. IT-based self-
    management interventions can provide home-based support, but
    have mixed results. We conducted a case series of an off-the-
    shelf Internet-based health-promotion program, The Preventive
    Plan (TPP), coupled with Nurse-coach support, which aimed to
    increase patient activation and provide self-management
    benefits.
    </AbstractText>
    <AbstractText Label="METHODS">A total of 19 COPD patients were
    recruited, and 14 completed 3-month follow-up in two groups:
    groups 1 and 2 with more and less advanced COPD, respectively.
    Change in patient activation was determined with paired t-tests
    and Wilcoxon signed-rank tests. Benefits and user experience
    were explored in semistructured interviews, analyzed
    thematically.</AbstractText>
    <AbstractText Label="RESULTS">Only group 1 improved
    significantly in activation, from a lower baseline than group 2;
    group 1 also improved significantly in mastery and anxiety. Both
```

```
    groups felt significantly more informed about COPD and reported
    physical functioning improvements. Group 1 reported improvements
    in mood and confidence. Overall, group 2 reported fewer benefits
    than group 1. Both groups valued nurse-coach support; for group
    1, it was more important than TPP in building confidence to
    self-manage. The design of TPP and lack of motivation to use IT
    were barriers to use, but disease severity and poor IT skills
    were not. </AbstractText>
    <AbstractText Label="DISCUSSION">Our findings demonstrate the
    feasibility of combining nurse-coach support aligned to an
    Internet-based health resource, TPP, in COPD and provide
    learning about the challenges of such an approach and the
    importance of the nurse-coach role.</AbstractText>
  </Abstract>
  <OtherAbstract Language="eng" Type="plain-language-summary">An
    important part of managing COPD is self-management by the
    patient. With IT-based self-management programs, patients can do
    this from their own home, which is easier for them and more
    cost-effective for the health care provider. Our goal was to
    explore how a generic Internet-based health-promotion program,
    The Preventive Plan (TPP), containing programs to support
    behavior change and health information, combined with support
    from a specialist nurse, could help patients to manage their
    COPD... Our findings demonstrate that a low-intensity
    intervention can produce meaningful benefits, and provides
    learning about the challenges of this approach and the
    importance of the nurse coach role.
  </OtherAbstract>
  <CopyrightInformation>Copyright© 2017 Early et al. This work is
  published and licensed by Dove Medical Press limited.
  </CopyrightInformation>
  <CoiStatement>The authors report no conflicts of interest in this
  work.</CoiStatement>
  <ObjectList>
    <Object Type="keyword">
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    </Object>
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      <Param Name="id">RO1DK561234</Param>
      <Param Name="grantor">National Institutes of Health</Param>
    </Object>
    <Object Type="grant">
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      <Param Name="grantor">The British Granting Agency</Param>
      <Param Name="acronym">BGA</Param>
      <Param Name="country">England</Param>
    </Object>
  </ObjectList>
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```
        <Citation>British Lung Foundation Chronic obstructive
        pulmonary disease (COPD) statistics. [Accessed January 27,
        2017]. </Citation>
        <ArticleIdList>
          <ArticleId IdType="pmcid">PMC4153410</ArticleId>
          <ArticleId IdType="pubmed">24768240</ArticleId>
        </ArticleIdList>
      </Reference>
      <Reference>
        <Citation>Yohannes AM, Baldwin RC, Connolly MJ. Depression and
        anxiety in elderly patients with chronic obstructive pulmonary
        disease. Age Ageing. 2006;35(5):457–459. </Citation>
        <ArticleIdList>
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          <ArticleId IdType="pubmed">20932581</ArticleId>
        </ArticleIdList>
      </Reference>
    </ReferenceList>
  </Article>
</ArticleSet>
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## Example of a Non-English XML file

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      <JournalTitle>Chronic Dis Inj Can</JournalTitle>
      <Issn>1925-6523</Issn>
      <Volume>33</Volume>
      <Issue>4</Issue>
      <PubDate PubStatus="ppublish">
        <Year>2013</Year>
        <Month>Sep</Month>
      </PubDate>
    </Journal>
    <ArticleTitle>Improved estimation of the health and economic burden
    of chronic disease risk factors in Manitoba.</ArticleTitle>
    <FirstPage>236</FirstPage>
    <LastPage>246</LastPage>
    <Language>EN</Language>
    <Language>FR</Language>
    <AuthorList>
      <Author>
        <FirstName>H</FirstName>
        <LastName>Krueger</LastName>
        <AffiliationInfo>
        <Affiliation>School of Population and Public Health, University
        of British Columbia, Vancouver, British Columbia,
        Canada.</Affiliation>
        </AffiliationInfo>
        <AffiliationInfo>
        <Affiliation>H. Krueger &amp; Associates Inc., Delta, British
        Columbia, Canada.</Affiliation>
        </AffiliationInfo>
      </Author>
```

```
      <Author>
        <FirstName>D</FirstName>
        <LastName>Williams</LastName>
        <Affiliation>H. Krueger &amp; Associates Inc., Delta, British
        Columbia, Canada.</Affiliation>
      </Author>
      <Author>
        <FirstName>A E</FirstName>
        <LastName>Ready</LastName>
        <Affiliation>Faculty of Kinesiology and Recreation Management,
        University of Manitoba, Winnipeg, Manitoba,
        Canada.</Affiliation>
      </Author>
      <Author>
        <FirstName>L</FirstName>
        <LastName>Trenaman</LastName>
        <Affiliation>H. Krueger &amp; Associates Inc., Delta, British
        Columbia, Canada</Affiliation>
      </Author>
      <Author>
        <FirstName>D</FirstName>
        <LastName>Turner</LastName>
        <AffiliationInfo>
        <Affiliation>Department of Community Health Sciences,
        University of Manitoba, Winnipeg, Manitoba,
        Canada.</Affiliation>
        </AffiliationInfo>
        <AffiliationInfo>
        <Affiliation>CancerCare Manitoba, Winnipeg, Manitoba,
        Canada.</Affiliation>
        </AffiliationInfo>
      </Author>
    </AuthorList>
    <PublicationType>Journal Article</PublicationType>
    <Abstract>
      <AbstractText Label="INTRODUCTION">There are analytic challenges involved with
estimating the aggregate burden of multiple risk factors (RFs) in a population. We
describe a methodology to account for overlapping RFs in some sub-populations, a
phenomenon that leads to "double-counting" the diseases and economic burden generated by
those factors.</AbstractText>
      <AbstractText Label="METHODS">Our method uses an efficient approach to accurately
analyze the aggregate economic burden of chronic disease across a multifactorial system.
In addition, it involves considering the effect of body weight as a continuous or
polytomous exposure that ranges from no excess weight through overweight to obesity. We
then apply this method to smoking, physical inactivity and overweight/obesity in
Manitoba, a province of Canada.</AbstractText>
      <AbstractText Label="RESULTS">The annual aggregate economic burden of the RFs in
Manitoba in 2008 is about $1.6 billion ($557 million for smoking, $299 million for
physical inactivity and $747 million for overweight/obesity). The total burden represents
a 12.6% downward adjustment to account for the effect of multiple RFs in some individuals
in the population.</AbstractText>
      <AbstractText Label="CONCLUSIONS">An improved estimate of the aggregate economic
burden of multiple RFs in a given population can assist in prioritizing and gaining
support for primary prevention initiatives.</AbstractText>
    </Abstract>
    <OtherAbstract Language="fr">
      <AbstractText Label="TITRE">Meilleure estimation du fardeau que représentent les
facteurs de risque de maladie chronique pour la santé et l’économie au Manitoba.</
AbstractText>
```

```
      <AbstractText Label="INTRODUCTION">L’estimation du fardeau global que représentent
les facteurs de risque multiples au sein d’une population présente certains défis d’ordre
analytique. Nous décrivons une méthodologie permettant de tenir compte des facteurs de
risque se chevauchant dans certaines sous-populations et entraînant un « double compte »
des maladies et du fardeau économique qu’ils engendrent.</AbstractText>
      <AbstractText Label="MÉTHODOLOGIE">Notre démarche permet d’analyser avec précision
le fardeau économique global des maladies chroniques dans un cadre multifactoriel tout en
tenant compte de l’incidence du poids en tant qu’exposition continue ou polytomique
(allant de l’absence d’excédent de poids au surpoids et à l’obésité). Nous appliquons
cette méthode au tabagisme, à l’inactivité physique et au surpoids et à l’obésité à la
province du Manitoba (Canada).</AbstractText>
      <AbstractText Label="RÉSULTATS">En 2008, le fardeau économique global annuel des
facteurs de risque au Manitoba était d’environ 1,6 milliard de dollars (557 millions pour
le tabagisme, 299 millions pour l’inactivité physique et 747 millions pour le surpoids et
l’obésité). Le fardeau total représente un rajustement à la baisse de 12,6% lorsqu’on
tient compte de l’effet des facteurs de risque multiples chez certaines personnes.</
AbstractText>
      <AbstractText Label="CONCLUSION">Une meilleure estimation du fardeau économique
global des facteurs de risque multiples au sein d’une population peut faciliter
l’établissement des priorités et améliorer le soutien aux initiatives de prevention
primaire. </AbstractText>
    </OtherAbstract>
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</ArticleSet>
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## Example of an Ahead of Print XML file


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      <JournalTitle>Lancet</JournalTitle>
      <Issn>1474-547X</Issn>
      <Volume/>
      <Issue/>
      <PubDate PubStatus="aheadofprint">
```

```
        <Year>2015</Year>
        <Month>Feb</Month>
        <Day>13</Day>
      </PubDate>
    </Journal>
    <ArticleTitle>Hepatitis C.</ArticleTitle>
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    <LastPage/>
    <ELocationID EIdType="doi">10.1016/S0140-6736(14)62401-
    6</ELocationID>
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    <Language>EN</Language>
      <AuthorList>
        <Author>
          <FirstName>Daniel P</FirstName>
          <LastName>Webster</LastName>
          <Affiliation>Department of Virology, Royal Free London NHS
          Foundation Trust, London, UK.</Affiliation>
        </Author>
        <Author>
          <FirstName>Paul</FirstName>
          <MiddleName>P</MiddleName>
          <LastName>Klenerman</LastName>
          <Affiliation>National Institute for Health Research (NIHR)
          Biomedical Research Centre and Nuffield Department of
          Medicine, University of Oxford, Oxford,UK.</Affiliation>
       </Author>
       <Author>
         <FirstName>Geoffrey M</FirstName>
         <LastName>Dusheiko</LastName>
         <Affiliation>Institute of Liver and Digestive Health,
         University College London, London, UK.</Affiliation>
       </Author>
     </AuthorList>
     <PublicationType>REVIEW</PublicationType>
     <ArticleIdList>
       <ArticleId IdType="pii">S0140-6736(14)62401-6</ArticleId>
       <ArticleId IdType="doi">10.1016/S0140-6736(14)62401-
       6</ArticleId>
     </ArticleIdList>
     <Abstract>Hepatitis C virus (HCV) infection is a major health problem worldwide. The
effects of chronic infection include cirrhosis, end-stage liver disease, and
hepatocellular carcinoma. As a result of shared routes of transmission, co-infection with
HIV is a substantial problem, and individuals infected with both viruses have poorer
outcomes than do peers infected with one virus. No effective vaccine exists, although
persistent HCV infection is potentially curable. The standard of care has been
subcutaneous interferon alfa and oral ribavirin for 24-72 weeks. This treatment results
in a sustained virological response in around 50% of individuals, and is complicated by
clinically significant adverse events. In the past 10 years, advances in HCV cell culture
have enabled an improved understanding of HCV virology, which has led to development of
many new direct-acting antiviral drugs that target key components of virus replication.
These direct-acting drugs allow for simplified and shortened treatments for HCV that can
be given as oral regimens with increased tolerability and efficacy than interferon and
ribavirin. Remaining obstacles include access to appropriate care and treatment, and
development of a vaccine. </Abstract>
  </Article>
</ArticleSet>
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# Example of a Replaces XML file


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"https://dtd.nlm.nih.gov/ncbi/pubmed/in/PubMed.dtd">
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      <Issn>1938-2715</Issn>
      <Volume>31</Volume>
      <Issue>2</Issue>
      <PubDate PubStatus="ppublish">
        <Year>2014</Year>
        <Month>Mar</Month>
      </PubDate>
    </Journal>
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    <ArticleTitle>Neuromodulation and palliative
    medicine.</ArticleTitle>
    <FirstPage>211</FirstPage>
    <LastPage>219</LastPage>
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    <Language>EN</Language>
    <AuthorList>
      <Author>
        <FirstName>Howard S</FirstName>
        <LastName>Smith</LastName>
        <Affiliation>Department of Anesthesiology, Albany Medical
        College, Albany, NY, USA.</Affiliation>
      </Author>
      <Author>
        <FirstName>Julie G</FirstName>
        <LastName>Pilitsis</LastName>
        <AffiliationInfo>
        <Affiliation>Center for Neuropharmacology and Neuroscience,
        Albany Medical College, Albany, NY USA.</Affiliation>
        </AffiliationInfo>
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        <Affiliation>Division of Neurosurgery, Albany Medical Center,
        Albany, NY USA.</Affiliation>
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      </Author>
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    <PublicationType>JOURNAL ARTICLE</PublicationType>
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      <ArticleId IdType="doi">10.1177/1049909113482745</ArticleId>
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      <PubDate PubStatus = "aheadofprint">
        <Year>2013</Year>
        <Month>3</Month>
        <Day>26</Day>
      </PubDate>
    </History>
    <Abstract>The palliative care population is generally vulnerable to experiencing
medication-induced adverse effects and drug-drug interactions. Neuromodulation may offer
```

```
particular advantages over systemic medications in this population. Spinal cord
stimulation and peripheral nerve stimulation have long been utilized in efforts to
provide analgesia for various painful conditions. More recently, deep brain stimulation/
motor cortex stimulation has anecdotally been utilized for certain intractable pain
states. Although brain electrical stimulation has not been adequately trialed or in some
cases even tried at all for management of a variety of symptoms, it is conceivable that
in the future it may be a potential therapeutic option in efforts to palliate various
severe refractory symptoms (eg, intractable pain, nausea, dyspnea, delirium).</Abstract>
    <ObjectList>
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        <Param Name="value">electrical</Param>
      </Object>
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         <Param Name="value">nausea</Param>
      </Object>
      <Object Type="keyword">
        <Param Name="value">neuromodulation</Param>
      </Object>
      <Object Type="keyword">
        <Param Name="value">pain</Param>
      </Object>
      <Object Type="keyword">
        <Param Name="value">palliative care</Param>
       </Object>
       <Object Type="keyword">
         <Param Name="value">stimulation</Param>
       </Object>
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</ArticleSet>
```


## Instructions for articles published in Non-English Languages

Here is an example of a non-English language citation:

[Cell cycle inhibitors in endocrine receptor positive breast cancer].
Sablin MP, Ricci F, Loirat D, Jobard A, Basse C, Romano E, Le Tourneau C, Dieras V.
Bull Cancer. 2017 Feb;104(2):114-122. doi: 10.1016/j.bulcan.2016.12.005. Epub 2017 Jan 23. French.
PMID: 28126188

The [brackets] around the article title and the text "French" indicate the full-text of the article is in a language other than English. The French article title can be viewed by selecting the XML display for this citation in PubMed.

Publishers may submit abstracts in languages other than English. The non-English abstract text should be submitted within the <OtherAbstract> element. The Language attribute should contain the two- or three-letter code for the language of the abstract.

```
<OtherAbstract Language="it">Unroofed coronary sinus comprende un insieme di anomalie
cardiache in cui la parete comune fra seno coronarico e atrio sinistro e parzialmente o
completamente assente. La maggior parte dei casi e associata a un ritorno venoso
```

```
sistemico anomalo, come la persistenza della vena cava superiore sinistra. La diagnosi di
questa anomalia e importante per la prognosi del paziente, ma e spesso difficoltosa a
causa dei segni clinici aspecifici. Qui illustriamo un caso di assenza completa del tetto
del seno coronarico associato a persistenza della vena cava superiore sinistra,
riscontrato durante un esame di tomografia computerizzata effettuato per ipertensione
polmonare.</OtherAbstract>
```

Publishers submitting files for articles published in non-English languages often have specific questions about how to construct their XML files. Here are some guidelines for the submission of non-English articles. We also have a sample XML file for this type of article.

## Tags involved

- The <Language> tag should contain the two- or three-letter code for the language the article is in. If unspecified, EN (English) is the default code. See our list of Language Tag Codes (Table 1), a subset of the ISO 639 standard for language codes.
- The <ArticleTitle> tag should contain the article title, in English, if published in English or translated to English in the journal. Do **not** fill this tag if the published title is not in English or is not translated to English in the journal.
- The <VernacularTitle> should contain the article title in the original language, if not in English. It is used only for Latin based alphabets; articles in non-Latin alphabets should leave this tag blank.
- The <OtherAbstract> should contain the non-English abstract text, if available.

## Rules to Remember

- When constructing XML files for citations published in non-English languages it is important to use the final/published version of the article as the authority on what citation data should be included in the file. If English translations for titles or abstracts are not in the article, do not include them.
- Author Names and Vernacular Titles frequently contain special characters.
- If the full text of an article appears in more than one language in the same issue, submit multiple language tags listed in the order in which the texts appear in the journal, not in the alphabetical order of the symbols. If one of the languages is English, enter EN first. For example, an article which appears full-text in both Chinese and English should be coded as:

```
<Language>EN</Language>                    <Language>ZH</Language>
```

- If the full text of an article appears in one language, but the abstract appears in two or more languages, the <Language> tag should contain only the code for the language of the full-text article.
- For articles that are published in multiple languages, the PubMed citation will display the various languages when the full translations are available at the original time of publication. An unlimited number of languages may display. PubMed data providers are responsible for including all appropriate languages as part of the XML citation data submitted to PubMed.

### Some examples:

| If the article contains... | Your XML file should contain... |
|---|---|
| a title in Japanese characters and a title in English | the English title in the <ArticleTitle> tags and empty <VernacularTitle> tags |
| author names in Chinese characters only | empty <Author> tags |
| Russian transliterated names and affiliations | transliterated names in the <Author> tags and affiliations in the <Affiliation> tags; however, you should check the transliterations against NLM's System of Transliteration and make changes if necessary. |

*Table continued from previous page.*

| If the article contains... | Your XML file should contain... |
|---|---|
| an English abstract, but article title and author names in Cyrillic only | the English abstract and transliterated Cyrillic in <ArticleTitle> and <Author> tags. |

**Table 2:** Slavic Transliteration (1995)

| Russian | | | Ukrainian | | | Bulgarian | | | Serbian | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| А | а | a | А | а | a | А | а | a | А | а | a |
| Б | б | b | Б | б | b | Б | б | b | Б | б | b |
| В | в | v | В | в | v | В | в | v | В | в | v |
| Г | г | g | Г | г | g | Г | г | g | Г | г | g |
| Д | д | d | Д | д | d | Д | д | d | Д | д | d |
| | | | | | | | | | Ђ | ђ | dj |
| Е | е | e | Е | е | e | Е | е | e | Е | е | e |
| | | | Є | є | ie | | | | | | |
| Ё | ё | e | | | | | | | | | |
| Ж | ж | zh | Ж | ж | zh | Ж | ж | zh | Ж | ж | ź |
| З | з | z | З | з | z | З | з | z | З | з | z |
| И | и | i | И | и | y | И | и | i | И | и | i |
| | | | І | і | i | | | | | | |
| | | | Ї | ї | ï | | | | | | |
| Й | й | ĭ | Й | й | ĭ | Й | й | ĭ | | | |
| | | | | | | | | | Ј | ј | j |
| К | к | k | К | к | k | К | к | k | К | к | k |
| Л | л | l | Л | л | l | Л | л | l | Л | л | l |
| | | | | | | | | | Љ | љ | lj |
| М | м | m | М | м | m | М | м | m | М | м | m |
| Н | н | n | Н | н | n | Н | н | n | Н | н | n |
| | | | | | | | | | Њ | њ | nj |
| О | о | o | О | о | o | О | о | o | О | о | o |
| П | п | p | П | п | p | П | п | p | П | п | p |
| Р | р | r | Р | р | r | Р | р | r | Р | р | r |
| С | с | s | С | с | s | С | с | s | С | с | s |
| Т | т | t | Т | т | t | Т | т | t | Т | т | t |
| | | | | | | | | | Ћ | ћ | ć |
| У | у | u | У | у | u | У | у | u | У | у | u |
| | | | | | | | | | | | |
| Ф | ф | f | Ф | ф | f | Ф | ф | f | Ф | ф | f |
| Х | х | kh | Х | х | kh | Х | х | kh | Х | х | h |
| Ц | ц | ts | Ц | ц | ts | Ц | ц | ts | Ц | ц | c |

*Table 2 continued from previous page.*

| Russian | | | Ukrainian | | | Bulgarian | | | Serbian | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ч | ч | ch | Ч | ч | ch | Ч | ч | ch | Ч | ч | ĉ |
| | | | | | | | | | Ц | ц | dź |
| Ш | ш | sh | Ш | ш | sh | Ш | ш | sh | Ш | ш | ś |
| Щ | щ | shch | Щ | щ | shch | Щ | щ | shi | ---------- | | |
| Ъ | ъ | " | | | | Ъ | ъ | ŭ | ---------- | | |
| Ы | ы | y | | | | | | | ---------- | | |
| Ь | ь | ' | Ь | ь | ' | Ь | ь | ' | ---------- | | |
| Э | э | é | | | | | | | ---------- | | |
| Ю | ю | iu | Ю | ю | iu | Ю | ю | iu | ---------- | | |
| Я | я | ia | Я | я | ia | Я | я | ia | ---------- | | |

Adapted from A.L.A. Cataloging Rules for Authors & Titles Entries of the American Library Association, Chicago, 1949.

## Indexing English Editions of Journals

It is customary for journals to be indexed from the original language of publication. The language to be indexed is approved by the Literature Selection Technical Review Committee at the time a journal is accepted for MEDLINE indexing.

For non-English MEDLINE journals that create a separately published English edition after being accepted for indexing, the English edition may be indexed in lieu of the non-English edition upon request from the publisher and approval by the Index Section. Content and coverage of the English edition must match the content and coverage of the language originally indexed.

Submit requests to index English editions of non-English MEDLINE journals to Deborah Ozga, Head, Index Section (ozgad@mail.nih.gov).

# All About Ahead of Print

Publishers authorized to submit XML data to PubMed have the option of submitting citations prior to their publication in final or print format. This option is used for those publications in which the date of an article's electronic publishing predates publication in the journal issue or volume. When articles are first made available on a website (publishers' or other), the publisher or provider sends the same citation data made available to the public for inclusion in PubMed.

Often these types of citations contain partial citation information. For example, they might contain an article title and full abstract, but not contain a volume, issue, or page number. This information is expected to be filled in by a Replaces XML file after the issue or volume has been finalized or printed. These incomplete citation records hold an [Epub ahead of print] status until updated data is sent to PubMed. See our Ahead of Print File Example and the Replacement File that updates it.

**IMPORTANT: The Ahead of Print (AOP) mechanism must not be used for an article if its eventual publication is uncertain. In the rare case where an AOP citation is retracted, the citation information should remain on the publisher website. See our Ahead of Print Withdrawn policy**

Here's an example of an AOP citation in PubMed:

Ophthalmological findings in children with encephalitis.
Hellgren K, Fowler Å, Rydberg A, Wickström R.
Acta Ophthalmol. 2016 Dec 14. doi: 10.1111/aos.13305. [Epub ahead of print]
PMID: 27966268

The notation [Epub ahead of print] labels this citation as incomplete. Note it does not display a volume number or issue number or page numbers, only a publication date.

Here's the same citation after being updated with a Replacement File:

Ophthalmological findings in children with encephalitis.
Hellgren K, Fowler Å, Rydberg A, Wickström R.
Acta Ophthalmol. 2017 Feb;95(1):66-73. doi: 10.1111/aos.13305. Epub 2016 Dec 14.
PMID: 27966268

## Steps for creating an Ahead of Print file

- Construct an XML file according to the PubMed DTD, including all available citation information.
- If Volume, Issue, FirstPage and LastPage are unknown, these tags should be blank.
- Add the electronic publication date to the <PubDate> tag, along with the PubStatus="aheadofprint" attribute. The electronic publication date must be an exact date, one that includes completed tags for Year, Month and Day. Articles using the "aheadofprint" PubStatus attribute that do not contain exact publication dates will be rejected from loading to PubMed. **NOTE: The electronic publication date cannot be greater than 18 months prior to the month of uploading to PubMed.**
- Include an ArticleId in the file along with the appropriate ArticleId IdType attribute ("pii" or "doi"). This is REQUIRED of all AOP submissions.
- Check your file for errors and preview the PubMed Abstract display using the PubMed Citation File Validator.
- Upload the AOP file to the root of your private SFTP directory. (You will see an 'archive' folder in your directory. DO NOT put them in the 'archive' folder!)
- Wait for a Loader Report confirming the loading of the AOP file. If the file loaded successfully, PMIDs will appear for each citation submitted.
- Save the Loader Report until you are ready to update the citations; you may use the PMIDs for in the Replacement File.
- When you are ready to update your AOP citations, follow our Instructions for Replacement Files.

## Points to Remember

- Please notify the Data Provider Support Team [publisher@ncbi.nlm.nih.gov] if you intend to begin using the Ahead of Print function. Once you begin sending AOP files, it is **not** necessary to notify us before each new delivery.
- You can check your original AOP citations in PubMed using the query "pubstatusaheadofprint". For example, the search string Arch Microbiol[jour] AND 2015:2020[dp] AND pubstatusaheadofprint will retrieve all AOP citations with the journal title and dates indicated.
- Citations in AOP status can be updated/revised as many times as necessary prior to the submission of the final Replacement file. Simply follow the steps above, but add the <Replaces> tag and keep the PubDate PubStatus attribute as "aheadofprint".

# Instructions for Replacement Files

## Updating Ahead of Print citations

Data providers may submit Replaces files to update an Ahead of Print (AOP) citation. The AOP citation will be replaced in its entirety.

AOP citations eventually become "published" citations by way of the publisher sending a Replacement XML file with completed citation information. These replacement files must use the PubStatus attribute value "ppublish" or "epublish" in the <PubDate> tag in order to replace the AOP citation.

Take the following steps to update an AOP citation:

- Update the AOP citation file, adding the finalized citation information.
- Add the final publication date to the <PubDate> tag, along with the PubStatus="ppublish" or "epublish" attribute. The publication date must be exactly as it appears on the finalized article.
- "Move" the existing PubDate with PubStatus="aheadofprint" attribute to the <History> tag. This will enable the citation to retain the AOP publishing date in PubMed.
- Add a single <Replaces> tag to each <Article> to be updated. The <Replaces> tags should be placed after the <Journal> tags and before the <ArticleTitle> tags, and should contain the IdType attribute with one of the following values: "pubmed" (default), "pii", "doi" of the citation to be updated.
- Verify that the ArticleIdList (pii or doi) in the Replacement File matches the ArticleIdList in the AOP citation in PubMed. If these numbers do not match, the citation will not be updated.
- Check the file for errors and preview the PubMed Abstract display using the PubMed Citation File Validator.
- SFTP the Replacement File to your private SFTP account, placing it at the top of the directory. (You will see an 'archive' folder in your directory. DO NOT put them in the 'archive' folder!)
- Wait for a Loader Report confirming the loading of the Replacement File. Following the batch of articles is a "Total processed" message indicating the number of articles processed from the uploaded file and the number created, replaced, and rejected.

To correct an error in an AOP citation without changing its publication status:

1. Correct the AOP citation file.
2. Leave the PubStatus attribute as "aheadofprint".
3. Add a single Replaces tag to the citation in which the error occurred. The Replaces tags should be placed after the Journal tags and before the ArticleTitle tags, and should contain the IdType attribute with one of the following values: "pubmed" (default), "pii", "doi" of the citation to be corrected.
4. SFTP the Replacement File to your private SFTP account, placing it at the top of the directory.
5. Wait for a Loader Report confirming the loading of the Replacement File. Following the batch of articles is a "Total processed" message indicating the number of articles processed from the uploaded file and the number created, replaced, and rejected.

## Updating citations in any other status

We also accept Replaces files to update data in the following fields, regardless of the citation's status in PubMed:

- AuthorList (includes Author, Affiliation, Identifier)
- InvestigatorList (includes Investigator, Affiliation, Identifier)
- Pagination
- ELocationID
- OtherAbstract

- PII
- DOI

Although the update is targeted, the Replaces file should still be valid XML. Our loader will compare the content of the above fields in the Replaces file with the existing PubMed citation and only modify the content if it is different.

## Ahead of Print Withdrawn Policy

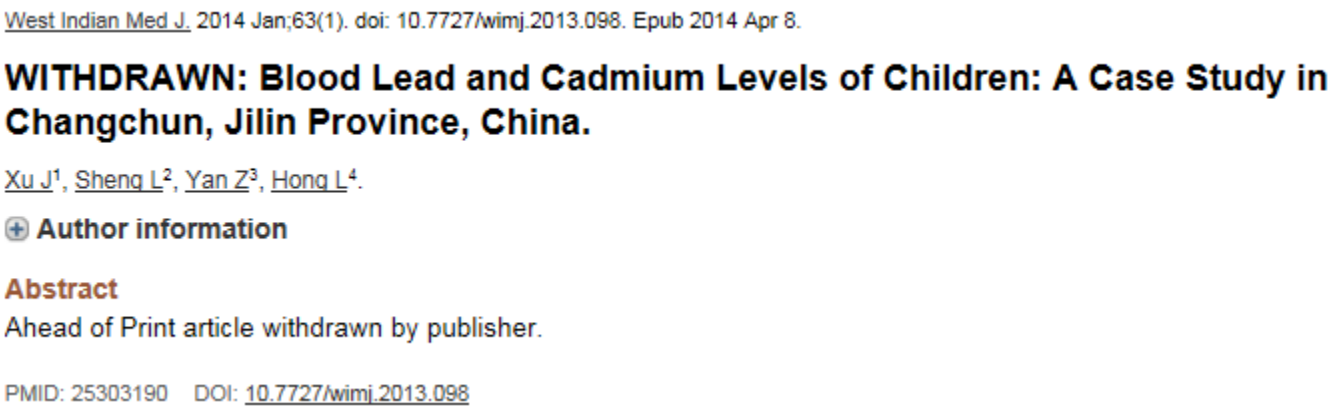
On rare occasions, a publisher may need to remove an Ahead of Print (AOP) article from a journal's website. There are a variety of reasons for this type of withdrawal: plagiarism, copyright infringements, duplicate publication in another journal. PubMed understands these circumstances cannot always be prevented before AOP citation data is uploaded to PubMed. Thus we have designed the following policy:

If an AOP article is removed completely from the journal's website, the publisher should have a Replacement file uploaded to PubMed. The Replacement file should use the following format:

The text "WITHDRAWN:" (without quotation marks) should appear at the beginning of the original article title in the <ArticleTitle> tag.

The text "Ahead of Print article withdrawn by publisher." (without quotation marks) should be added at the beginning of the original text within the <Abstract> tag. If desired the original abstract text may be completely replaced with the above text. For additional reference, see our Instructions for Replacement Files.

Here's an example:


West Indian Med J. 2014 Jan;63(1). doi: 10.7727/wimj.2013.098. Epub 2014 Apr 8.

**WITHDRAWN: Blood Lead and Cadmium Levels of Children: A Case Study in Changchun, Jilin Province, China.**

Xu J[1], Sheng L[2], Yan Z[3], Hong L[4].

**Author information**

**Abstract**

Ahead of Print article withdrawn by publisher.

PMID: 25303190 DOI: 10.7727/wimj.2013.098

If an AOP article is replaced on the journal's website with a Retraction or Withdrawn Notice then the publisher should have a Replacement file uploaded to PubMed. The Replacement file should match the text of the Retraction or Withdrawn Notice on the journal's website.

Here's an example:

Urology. 2017 Jan 11. pii: S0090-4295(17)30015-8. doi: 10.1016/j.urology.2017.01.003. [Epub ahead of print]

# WITHDRAWN: MicroRNA-99a Suppresses Proliferation, Migration, Invasion and Induces G1-phase Cell Cycle Arrest via Targeting Insulin-like Growth Factor 1 Receptor Pathway in Renal Cell Carcinoma 786-0 and OS-RC-2 Cells.

Hao B[1], Cui L[2], Gu Y[3], Zhang B[4], Wang M[1], Zhou H[5], Xu R[2], He X[2].

Author information

## Abstract

This article has been withdrawn at the request of the author(s) and/or editor. The Publisher apologizes for any inconvenience this may cause. The full Elsevier Policy on Article Withdrawal can be found at http://www.elsevier.com/locate/withdrawalpolicy.

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PMID: 28088554 DOI: 10.1016/j.urology.2017.01.003