



# Bioinformática



A service of the National Library of Medicine  
and the National Institutes of Health

[www.pubmed.gov](http://www.pubmed.gov)

## Advanced PubMed Searching

Prof. Giovani Rubert Librelotto, PhD

By the end of this session, you will be able to:

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- ▶ Construct a searchable question
  - ▶ Understand how to use MeSH headings and why it is useful to do so
  - ▶ Minimize “false hits” and save time
  - ▶ Identify other useful—but frequently overlooked—features of the PubMed database.
-

# Identify your puzzle pieces

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- ▶ Write down what you want to find!
- ▶ Underline the key concepts
- ▶ Consider how best to combine and refine the concepts



# Identify Key Concepts

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Is it risky for pregnant women to take antidepressants?

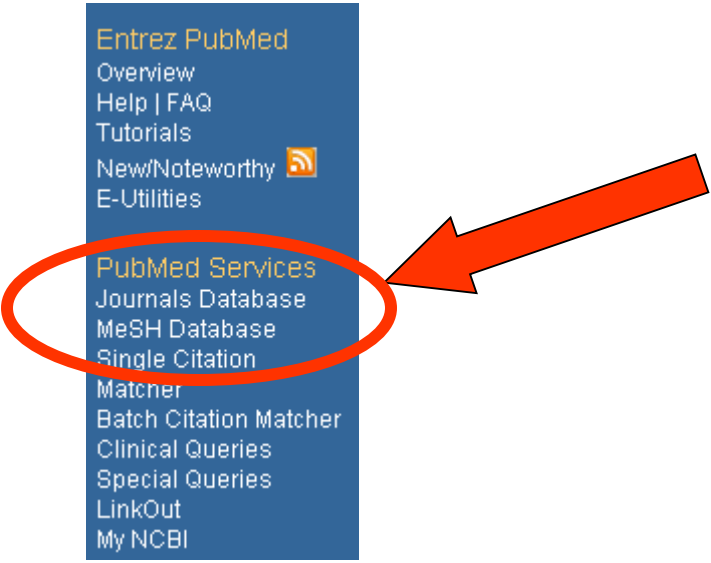
Risky – (Synonyms) Harm, adverse effects


Anti-depressants – Name of drug or drug(s)?

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# MeSH Database

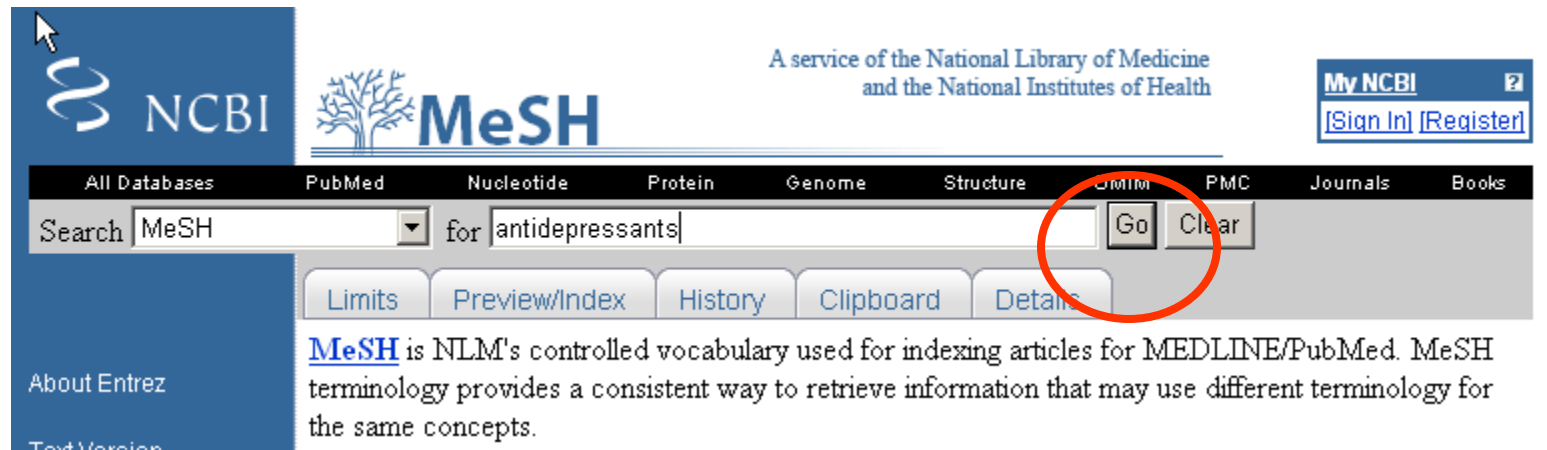
- ▶ Search one concept at a time.
- ▶ Identify correct subject headings
- ▶ Select appropriate subheadings



Entrez PubMed  
Overview  
Help | FAQ  
Tutorials  
New/Noteworthy   
E-Utilities  
**PubMed Services**  
Journals Database  
MeSH Database  
Single Citation  
Matcher  
Batch Citation Matcher  
Clinical Queries  
Special Queries  
LinkOut  
My NCBI

# Using MeSH

- Enter first concept and click Go



NCBI MeSH

A service of the National Library of Medicine  
and the National Institutes of Health

My NCBI [Sign In] [Register]

All Databases PubMed Nucleotide Protein Genome Structure MeSH PMC Journals Books

Search MeSH for antidepressants [Go] [Clear]

Limits Preview/Index History Clipboard Details

MeSH is NLM's controlled vocabulary used for indexing articles for MEDLINE/PubMed. MeSH terminology provides a consistent way to retrieve information that may use different terminology for the same concepts.

# Using MeSH

- ▶ Select by clicking checkbox
- ▶ Click the term to see possible subheadings

☒ 1: [Antidepressive Agents](#)

[Links](#)

Mood-stimulating drugs used primarily in the treatment of affective disorders and related conditions. Several MONOAMINE OXIDASE INHIBITORS are useful as antidepressants apparently as a long-term consequence of their modulation of catecholamine levels. The tricyclic compounds useful as antidepressive agents (ANTIDEPRESSIVE AGENTS, TRICYCLIC) also appear to act through brain catecholamine systems. A third group (ANTIDEPRESSIVE AGENTS, SECOND-GENERATION) is a diverse group of drugs including some that act specifically on serotonergic systems.

Year introduced: 1966

# Using MeSH

- If desired, select subheadings by clicking checkboxes.

Subheadings: This list includes those paired at least once with this heading in MEDLINE and may not reflect current rules for allowable combinations.

- ☐ administration and dosage
- ☐ adverse effects
- ☐ analysis
- ☐ antagonists and inhibitors
- ☐ blood
- ☐ cerebrospinal fluid
- ☐ chemical synthesis
- ☐ chemistry
- ☐ classification
- ☐ contraindications
- ☐ diagnostic use
- ☐ economics
- ☐ history
- ☐ immunology
- ☐ isolation and purification
- ☐ metabolism
- ☐ pharmacokinetics
- ☐ pharmacology
- ☐ physiology
- ☐ poisoning
- ☐ standards
- ☐ supply and distribution
- ☐ therapeutic use
- ☐ therapy
- ☐ toxicity
- ☐ urine



# Using MeSH

## ► Click Links and then PubMed

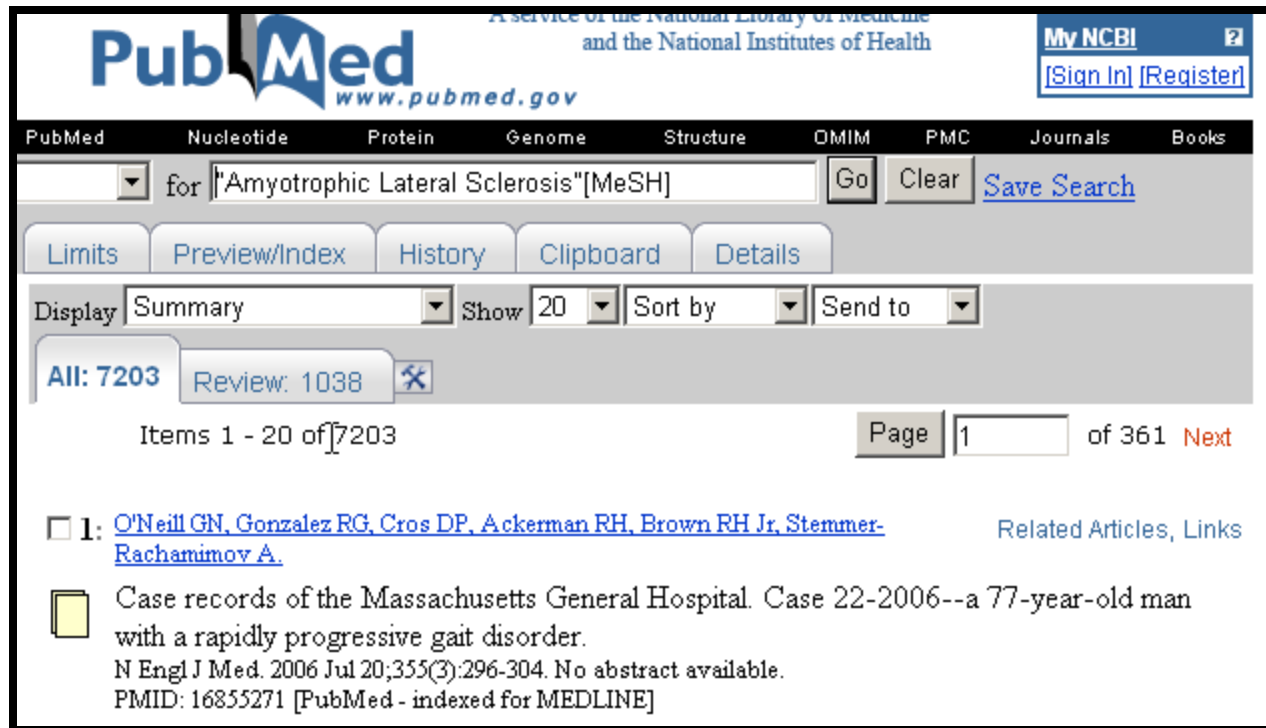
### ☒ 1: Antidepressive Agents

Mood-stimulating drugs used primarily in the treatment of affective disorders. Several MONOAMINE OXIDASE INHIBITORS are apparently as a long-term consequence of their modulation of catecholamine metabolism. Tricyclic compounds useful as antidepressive agents (ANTIDEPRESSIVE TRICYCLIC) also appear to act through brain catecholamine systems. A third group (ANTIDEPRESSIVE AGENTS, SECOND-GENERATION) is a diverse group of drugs including some that act specifically on serotonergic systems.  
Year introduced: 1966

Subheadings: This list includes those paired at least once with this heading in MEDLINE and may not reflect current rules for allowable combinations.



# Review Results



The screenshot shows the PubMed website interface. At the top, the PubMed logo and the text "A service of the National Library of Medicine and the National Institutes of Health" are visible. The URL "www.pubmed.gov" is also present. On the right, there are links for "My NCBI", "Sign In", and "Register". Below the header, a navigation bar includes links for "PubMed", "Nucleotide", "Protein", "Genome", "Structure", "OMIM", "PMC", "Journals", and "Books". The search bar contains the text "Amyotrophic Lateral Sclerosis"[MeSH], with "Go", "Clear", and "Save Search" buttons. Below the search bar, there are tabs for "Limits", "Preview/Index", "History", "Clipboard", and "Details". The "Display" dropdown is set to "Summary", and the "Show" dropdown is set to "20". The "Sort by" and "Send to" dropdowns are also visible. The results section shows "All: 7203" and "Review: 1038". The first result is listed as "Items 1 - 20 of 7203" and "Page 1 of 361". The first result is a case record from the Massachusetts General Hospital, dated 2006, describing a 77-year-old man with a rapidly progressive gait disorder. The citation is "N Engl J Med. 2006 Jul 20;355(3):296-304. No abstract available. PMID: 16855271 [PubMed - indexed for MEDLINE]".

PubMed Nucleotide Protein Genome Structure OMIM PMC Journals Books

for "Amyotrophic Lateral Sclerosis"[MeSH] Go Clear Save Search

Limits Preview/Index History Clipboard Details

Display Summary Show 20 Sort by Send to

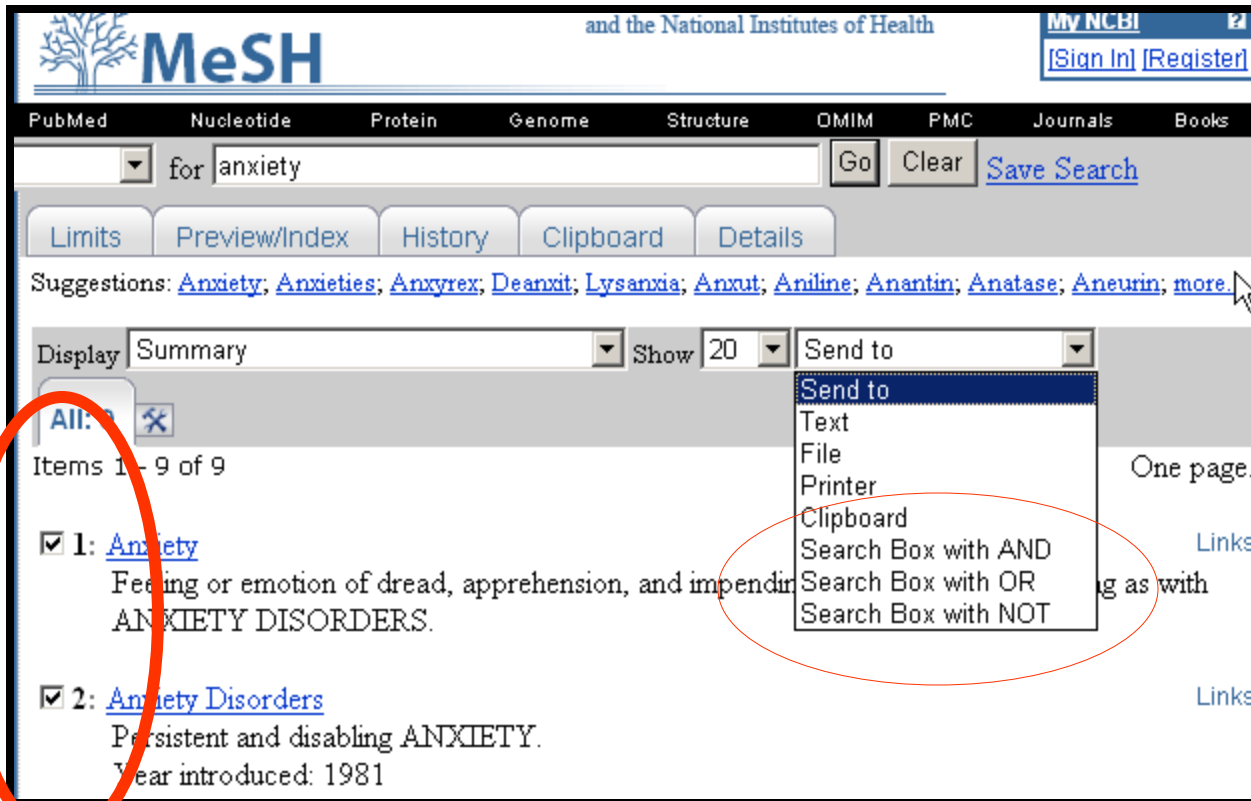
All: 7203 Review: 1038

Items 1 - 20 of 7203 Page 1 of 361 Next

1: O'Neill GN, Gonzalez RG, Cros DP, Ackerman RH, Brown RH Jr, Stemmer-Rachamimov A. Related Articles, Links

Case records of the Massachusetts General Hospital. Case 22-2006--a 77-year-old man with a rapidly progressive gait disorder.  
N Engl J Med. 2006 Jul 20;355(3):296-304. No abstract available.  
PMID: 16855271 [PubMed - indexed for MEDLINE]

# Search 2 or more related terms



MeSH and the National Institutes of Health

My NCBI [Sign In] [Register]

PubMed Nucleotide Protein Genome Structure OMIM PMC Journals Books

for anxiety Go Clear Save Search

Limits Preview/Index History Clipboard Details

Suggestions: [Anxiety](#); [Anxieties](#); [Anxyrex](#); [Deanxit](#); [Lysanxia](#); [Anxut](#); [Aniline](#); [Anantin](#); [Anatase](#); [Aneurin](#); [more](#).

Display Summary Show 20 Send to

All: [X]

Items 1 - 9 of 9

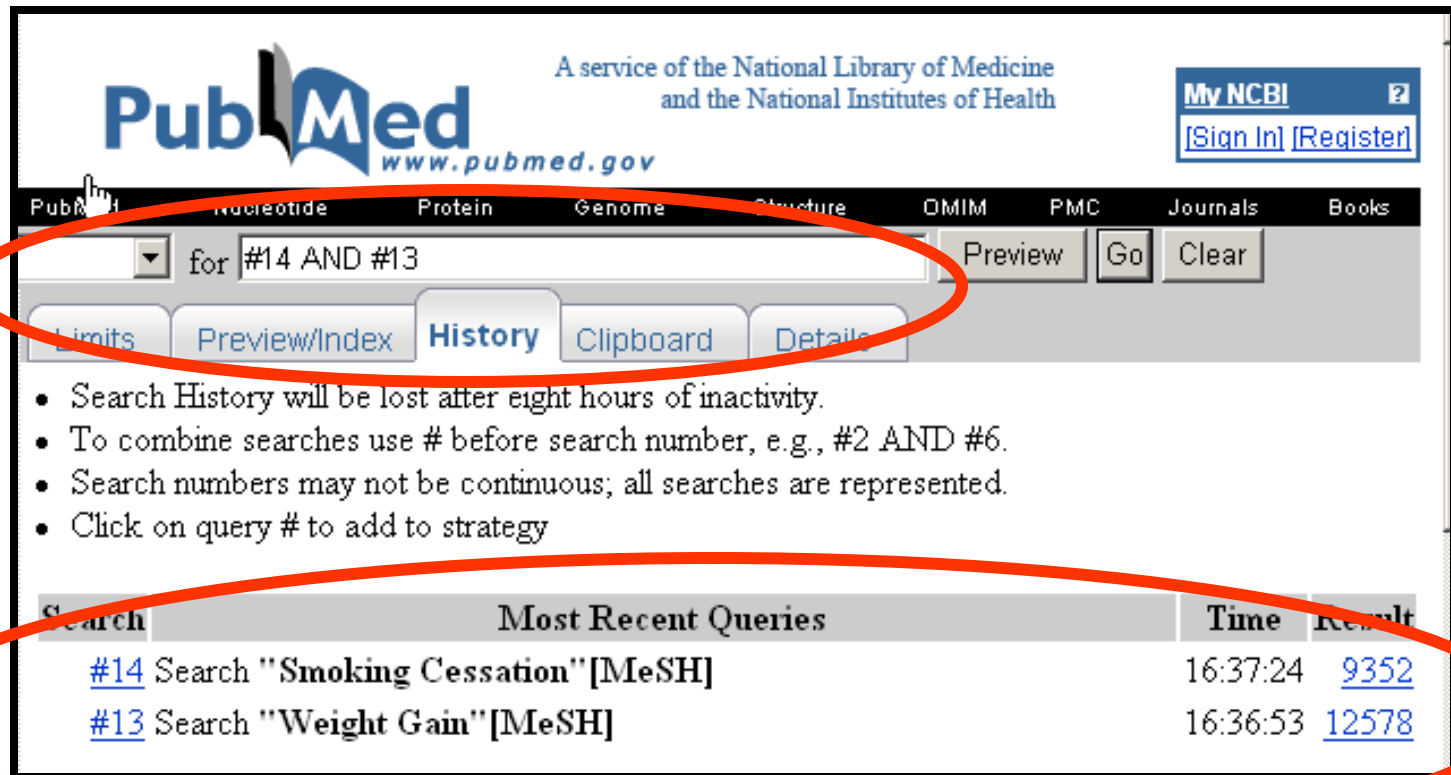
1: [Anxiety](#)  
Feeling or emotion of dread, apprehension, and impending disaster or more generally ANXIETY DISORDERS.

2: [Anxiety Disorders](#)  
Persistent and disabling ANXIETY.  
Year introduced: 1981

Send to  
Text  
File  
Printer  
Clipboard  
Search Box with AND  
Search Box with OR  
Search Box with NOT

One page.  
Links  
ing as with  
Links

# Combining Searches



The screenshot shows the PubMed website with a search bar containing the query "for #14 AND #13". Below the search bar, there are buttons for "Limits", "Preview/Index", "History", "Clipboard", and "Details". The "History" button is highlighted with a red oval. Below the buttons, there is a list of instructions:

- Search History will be lost after eight hours of inactivity.
- To combine searches use # before search number, e.g., #2 AND #6.
- Search numbers may not be continuous; all searches are represented.
- Click on query # to add to strategy

Below the instructions, there is a table titled "Most Recent Queries" showing the search history:

Search	Most Recent Queries	Time	Result
<a href="#">#14</a>	Search "Smoking Cessation"[MeSH]	16:37:24	<a href="#">9352</a>
<a href="#">#13</a>	Search "Weight Gain"[MeSH]	16:36:53	<a href="#">12578</a>

The table is also highlighted with a red oval. The search bar and the "History" button are also highlighted with a red oval.

# PubMed Boolean Operators

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AND

NOT

OR

---

# Available PubMed Limiters

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- ▶ Publication Date
  - ▶ Author
  - ▶ Language
  - ▶ Gender
  - ▶ Literature Type
  - ▶ Age
  - ▶ Journal
  - ▶ Journal Subset
-

# Limiting a search



The image shows a search results control bar. A red circle highlights the 'Limits' tab, and a red rectangle highlights the entire bar. The bar contains the following elements:

- Tabs: Limits, Preview/Index, History, Clipboard, Details
- Display: Summary (dropdown)
- Show: 20 (dropdown)
- Sort by: (dropdown)
- Send to: (dropdown)
- Buttons: All: 168, Review: 23, and a search icon (magnifying glass)

# Limiting a search



The screenshot shows a search interface with several sections for limiting a search. At the top, there are tabs: **Limits**, **Preview/Index**, **History**, **Clipboard**, and **Details**. Below the tabs, a blue instruction reads: "Limit your search by any of the following criteria." The interface includes three main sections, each with a "CLEAR" button on the right:

- Search by Author**: Includes an "Add Author" button.
- Search by Journal**: Includes an "Add Journal" button.
- Full Text, Free Full Text, and Abstracts**: Includes three checkboxes: ☐ Links to full text, ☐ Links to free full text, and ☐ Abstracts.

At the bottom, there is a **Dates** section with a "CLEAR" button and a dropdown menu labeled "Published in the Last:" with "Any date" selected.

Remember to scroll down for more limits; click Go at bottom of limits page when finished



# Results Formats

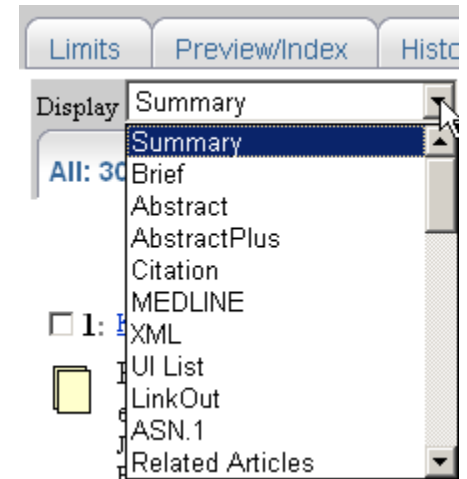
---

<b>Summary</b>  Basic Bibliographic Citation (default)	<b>Abstract</b>  Includes abstract if available
<b>Brief</b>  First author, first few words, PMID	<b>Citation</b>  Citation, Abstract & Subject Headings

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# Changing Results Format

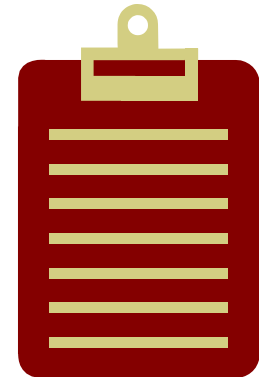
- ▶ Pull down menu on display bar
- ▶ Select desired format
- ▶ Change occurs automatically



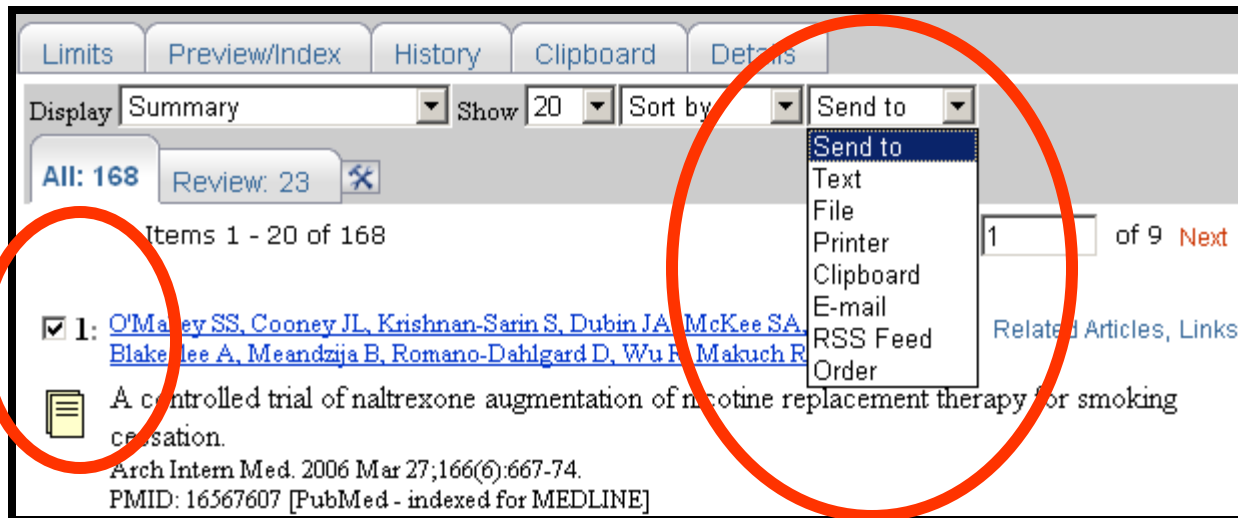
# Clipboard

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- ▶ Holds up to 500 citations
- ▶ Retains search for 8 hours (from IP address)
- ▶ Several searches – one print job!

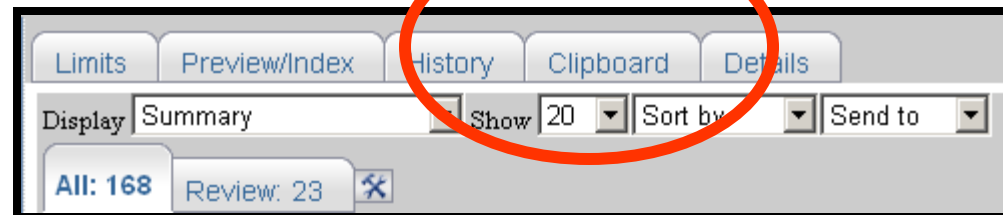


# Using Clipboard



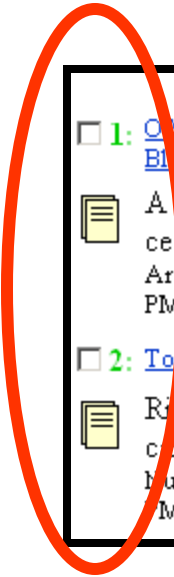
Send to  
Clipboard

## View Clipboard



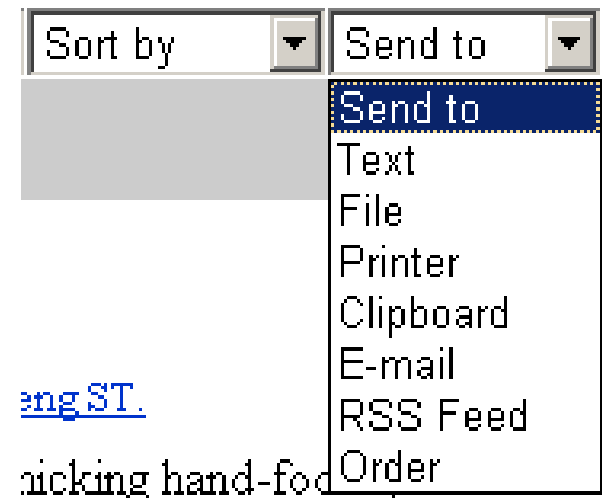
# Viewing Clipboard

Note that added citation numbers turn green

- 
- ☐ 1: [O'Malley SS, Cooney JL, Krishnan-Sarin S, Dubin JA, McKee SA, Cooney NL, Blakeslee A, Meandzija B, Romano-Dahlgard D, Wu R, Makuch R, Jatlow P.](#) [Related Articles, Links](#)  
A controlled trial of naltrexone augmentation of nicotine replacement therapy for smoking cessation.  
Arch Intern Med. 2006 Mar 27;166(6):667-74.  
PMID: 16567607 [PubMed - indexed for MEDLINE]
  - ☐ 2: [Toftstad S.](#) [Related Articles, Links](#)  
Rimonabant: a cannabinoid receptor blocker for the treatment of metabolic and cardiovascular risk factors.  
Nutr Metab Cardiovasc Dis. 2006 Mar;16(2):156-62. Epub 2006 Jan 18. Review.  
PMID: 16487916 [PubMed - indexed for MEDLINE]

# Working with Results

- Save
- Email
- Text



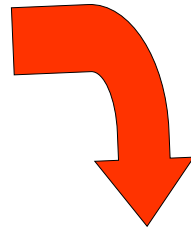
# Clinical Queries

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- ▶ Execute search with pre-established filters
  - ▶ Filters designed to isolate good quality information
  - ▶ Type all concepts in search box; include synonyms
  - ▶ If nothing, do regular PubMed search
-

# Clinical Queries

PubMed Services  
Journals Database  
MeSH Database  
Single Citation  
Matcher  
Batch Citation Matcher  
**Clinical Queries**  
Special Queries  
LinkOut  
My NCBI



## Search by Clinical Study Category

This search finds citations that correspond to a specific clinical study category. The search may be either broad and sensitive or narrow and specific. The search filters are based on the work of [Haynes RB et al.](#) See the [filter table](#) for details.

Search

Go

Category	Scope
<input type="radio"/> etiology	<input checked="" type="radio"/> narrow, specific search
<input type="radio"/> diagnosis	<input type="radio"/> broad, sensitive search
<input checked="" type="radio"/> therapy	
<input type="radio"/> prognosis	
<input type="radio"/> clinical prediction guides	



# Available Clinical Filters

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- ▶ Clinical Study Category
- ▶ Systematic Reviews
- ▶ Medical Genetics



# Other Useful NLM Tools

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- ▶ Single Citation Matcher
  - ▶ NLM Gateway
  - ▶ PubMedCentral
  - ▶ MedlinePlus – News
  - ▶ NCBI Bookshelf
-

# Single Citation Matcher

PubMed Services

Journals Database

MeSH Database

Single Citation

Matcher

Batch Citation Matcher

Clinical Queries

Special Queries

Link out

My NCBI

Journal:

Date:  (month and day are optional)

Volume:  Issue:  First page:

Author name (see [help](#))

☐ Only as first author ☐ Only as last author

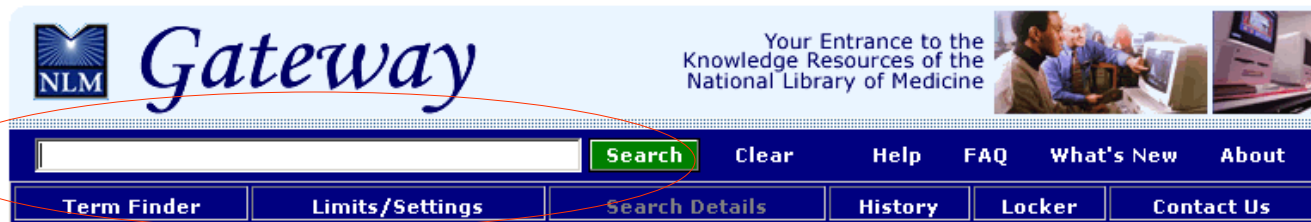
Title words:

Go

Clear

# NLM Gateway

- ▶ One-Stop research shopping
- ▶ Enter term or terms and click Search button



Enter term(s) in the box above to search across the following NLM resources:

## Bibliographic Resources

**MEDLINE/PubMed** - journal citations, abstracts  
**NLM Catalog** - books, AVs, serials  
**Bookshelf** - full text biomedical books

**TOXLINE Special** - toxicology citations  
**DART** - Developmental and Reproductive Toxicology  
**Meeting Abstracts**

## Consumer Health Resources

**MedlinePlus** - Health Topics  
**MedlinePlus** - Drug Information  
**MedlinePlus** - Medical Encyclopedia  
**MedlinePlus** - Current Health News  
**MedlinePlus** - Other Resources

**ClinicalTrials.gov**  
**DIRLINE** - Directory of Health Organizations  
**Genetics Home Reference**  
**Household Products Database**

# PubMedCentral

- Full-text resources—many quite current



# MedlinePlus - News



## Health Topics

Start here with over 700 topics on conditions, diseases and wellness

## Drugs & Supplements

About your prescription and over-the-counter medicines, herbs and supplements

## Medical Encyclopedia

## Current Health News

- ▶ [Don't Let Ear Pain Spoil Summer Fun](#)
- ▶ [ER Visits for Stroke Increase Around Birthdays](#)
- ▶ [Diet and Exercise: The Real Fountains of Youth](#)
- ▶ [More news](#)


Friday, July 28: [Return to top](#)

- [Amnesia Study Sheds Light on Memory](#) (HealthDay)
- [Australian Study Finds Fish Oil Helps Weight Loss](#) (Reuters Health)
- [Better Diagnosis of Vocal Cord Problems Needed](#) (Reuters Health)
- [Blood Clot Risk Similar in Vaginal Ring and Pill](#) (Reuters Health)
- [Diet and Exercise: The Real Fountains of Youth](#) (HealthDay)
- [ER Visits for Stroke Increase Around Birthdays](#) (Reuters Health)
- [Early Social Stimulation Helps Stunted Children](#) (Reuters Health)
- [For Lessons on Fighting AIDS, Look South](#) (HealthDay)
- [Home DNA Tests Misleading](#) (Reuters Health)
- [Many Couples Would Give Frozen Embryos to Research](#) (Reuters Health)
- [Patient's Sexuality May Have Impact on Care](#) (HealthDay)
- [Pharmacists Rap New Version of Decongestants](#) (HealthDay)
- [Protopop Effective for Nickel-Induced Allergy](#) (Reuters Health)
- [Robot Technology Improves Vaginal Prolapse Surgery](#) (HealthDay)
- [Scorpion Venom Tested Against Brain Cancer](#) (HealthDay)
- [Skin Discoloration Common with Arthritis Drug](#) (Reuters Health)
- [Special Ed Students May Have High Asthma Rates](#) (Reuters Health)
- [Study Debunks Birth Season-Autism Risk Link](#) (Reuters Health)
- [Vision Test Can Help Spot 'Lazy Eye'](#) (HealthDay)

- ▶ Latest health news headlines
- ▶ Good for “back-tracking” from patient questions

# NCBI Bookshelf

- Free full-text books on several topics



The screenshot shows the NCBI Bookshelf homepage. At the top, there's a navigation bar with links to various databases: All Databases, PubMed, Nucleotide, Protein, Genome, Structure, PMC, Taxonomy, OMIM, and Books. Below this is a search bar with the text "Search Books" and a "Go" button. To the right of the search bar are links for "Limits", "Preview/Index", "History", "Clipboard", and "Details". On the left side, there's a blue sidebar with links: "About Entrez", "Books" (highlighted), "Overview", "Using the books", "Information for authors and publishers", and "Contact us". The main content area features a red-bordered box with the following text:

The **Bookshelf** is a growing collection of biomedical books that can be searched directly by typing a concept into the textbox above and selecting "Go". Try one of these searches:

- [cell cycle control](#)
- [immunodeficiency](#)
- [protein evolution](#)

Books are also linked to terms in PubMed abstracts: when viewing an abstract, select the "Books" link to see [phrases](#) within the abstract hyperlinked to book sections.

► **New on the Bookshelf:**

 **Disease Control Priorities in Developing Countries** 2nd ed.  
Dean T. Jamison, Joel G. Breman, Anthony R. Measham, George Alleyne, Mariam Claeson, David B. Evans, Prabhat Jha, Anne Mills, Philip Musgrove, editors  
Washington (DC): [IBRD/The World Bank and Oxford University Press](#); 2006

# PubMed FAQs

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- ▶ Why am I not finding anything on this new drug?
  - ▶ I do fine with keyword inquiries—why should I take the time to use MeSH?
  - ▶ I'm used to using OVID or some other database—why should I learn to use PubMed?
  - ▶ Can I save this search?
  - ▶ How does PubMed differ from OVID?
-



# Why am I not finding this new drug?

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- ▶ It may be too new to have been assigned a heading.
- ▶ Try searching the term **WITHOUT** using MeSH



# I do fine with keyword searching; why bother learning to use MeSH?

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- ▶ Relevance vs. “refuse”
- ▶ Maximizes search time
- ▶ Minimizes “false hits”



# Can I save this search?

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- ▶ Search strategies can be saved with My NCBI
  - ▶ Free registration
  - ▶ Email notification available for new search results
- 



# I'm used to using another database; why bother with PubMed?

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- ▶ It's available from any computer with an Internet connection.
  - ▶ Good quality information
  - ▶ Free full-text is often available
  - ▶ Frequently updated
- 





# How Does Ovid differ from PubMed?

	PubMed	Ovid
MeSH Mapping	Yes	Yes
Citation Matching	Yes	Yes
Clipboard Feature	Yes	No
Links to similar articles	Yes	Yes
Citations by email	Yes	Yes
# of Available Lit. Databases	2	Several
Availability outside of Library?	Anywhere	Must be UNC or ADL



# Bioinformática



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## Advanced PubMed Searching

Prof. Giovani Rubert Librelotto, PhD