



JOHNS HOPKINS
BLOOMBERG
SCHOOL *of* PUBLIC HEALTH

Section C

Building a High-Quality Search Strategy

Agenda

- Building a Medline search
- Finding MeSH and other PubMed record elements
- Creating a MeSH/Text word chart
- Controlling your search with field tags and other database tools
- Using study design filters
- Using the PRESS checklist

Development of MEDLINE Search Strategy

1. Start with simple search strategy
2. Run search, and retrieve reports
3. Analyze MeSH and keywords of studies fitting your criteria, and revise strategy
4. Re-run search with revised strategy
5. Repeat steps 2 through 4 if necessary
6. Run optimal search strategy
7. Retrieve reports identified with optimal search strategy

Developing Simple Search Strategy

- To develop simple search strategy ...
 - Start with your question
 - Break into concepts
 - ▶ Population
 - ▶ Intervention(s)
 - ▶ Comparison(s)
 - ▶ Outcome

Developing Simple Search Strategy: Example

- For patients with choroidal neovascularization associated with age-related macular degeneration, do intravitreal injections of Lucentis (Genentech), when compared with Avastin (Genentech), prevent vision loss?

P Individuals with choroidal neovascularization associated with age-related macular degeneration

I Lucentis (ranibizumab)

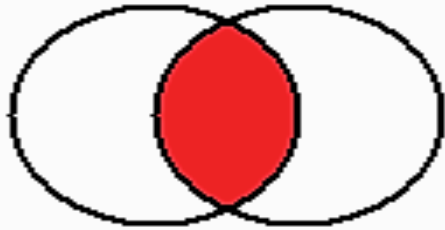
C Avastin (bevacizumab)

O Change in visual acuity or visual field

Searching PubMed

- Start with the general format:
 - (Population OR synonym #1 OR synonym #2) AND
 - (Intervention OR synonym #1 OR synonym #2) AND
 - (Comparator OR synonym #1 OR synonym #2) AND
 - (Outcome OR synonym #1 OR synonym #2) AND
- Add study type filter terms

Boolean Searching



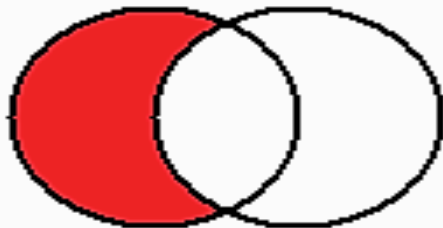
AND

Macular degeneration AND
intravitreal injections



OR

Lucentis OR ranibizumab



NOT

Search #1 NOT Search #2
(use as tool to evaluate
searches only)

Boolean Searching in PubMed

The screenshot displays the PubMed web interface. At the top, the search bar contains the query: "macular degeneration AND (Lucentis OR ranibizumab) AND (Avastin OR bevacizumab)". This search bar is circled in red. To the right of the search bar is a "Search" button. Below the search bar, there are links for "RSS", "Save search", and "Advanced".

On the left side, there are filters for "Article types" (Clinical Trial, Review, more...) and "Text availability" (Abstract available, Free full text available, Full text available). There are also filters for "Publication dates" (5 years, 10 years, Custom range...) and "Species" (Humans, Other Animals). A "Clear all" button is at the bottom of the filters.

The main content area shows the search results. At the top, it says "See 3 citations found by title matching your search:" followed by three citations. Below this, it says "Results: 1 to 20 of 400". The first two results are listed:

1. [Intravitreal ranibizumab and bevacizumab therapy for choroidal neovascularization in age-related macular degeneration with extensive pre-existing geographic atrophy.](#)
Amaro MH, Roller AB.
Arq Bras Oftalmol. 2012 Aug;75(4):273-6.
PMID: 23258680 [PubMed - in process] [Free Article](#)
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2. [The use of comparative effectiveness research to inform policy decisions on the inclusion of bevacizumab for the treatment of macular diseases in Thailand's pharmaceutical benefit package.](#)
Anothaisintawee T, Leelahavarong P, Ratanapakorn T, Teerawattananon Y.
Clinicoecon Outcomes Res. 2012;4:361-74. doi: 10.2147/CEOR.S37458. Epub 2012 Dec 6.
PMID: 23248574 [PubMed] [Free PMC Article](#)
[Related citations](#)

On the right side, there are sections for "49 free full-text articles in PubMed Central", "Find related data", and "Search details". The "Search details" section shows the search query: {"macular degeneration"[MeSH Terms] OR ("macular"[All Fields] AND "degeneration"[All Fields]) OR "macular degeneration"[All Fields]} AND {"ranibizumab"[Supplementary]

Boolean Searching in PubMed

NCBI Resources How To

PubMed macular degeneration AND (Lucentis OR ranibizumab) AND (Avastin OR bevacizumab) Search

US National Library of Medicine
National Institutes of Health

Advanced

Search Details

Query Translation:

```
("macular degeneration"[MeSH Terms] OR ("macular"[All Fields] AND "degeneration"[All Fields]) OR "macular degeneration"[All Fields]) AND (("ranibizumab"[Supplementary Concept] OR "ranibizumab"[All Fields] OR "lucentis"[All Fields]) OR ("ranibizumab"[Supplementary Concept] OR "ranibizumab"[All Fields]) AND ("bevacizumab"[Supplementary Concept] OR "bevacizumab"[All Fields] OR "avastin"[All Fields]) OR ("bevacizumab"[Supplementary Concept] OR "bevacizumab"[All Fields]))
```

Search URL

Result:

400

Translations:

macular degeneration	"macular degeneration"[MeSH Terms] OR ("macular"[All Fields] AND "degeneration"[All Fields]) OR "macular degeneration"[All Fields]
Lucentis	"ranibizumab"[Supplementary Concept] OR "ranibizumab"[All Fields] OR "lucentis"[All Fields]
ranibizumab	"ranibizumab"[Supplementary Concept] OR "ranibizumab"[All Fields]

Beginning of PubMed Record

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PubMed Limits Advanced

Search

Display Settings: Abstract

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N Engl J Med. 2011 May 19;364(20):1897-908. Epub 2011 Apr 28.

Ranibizumab and bevacizumab for neovascular age-related macular degeneration.

CATT Research Group, Martin DF, Maguire MG, Ying GS, Grunwald JE, Fine SL, Jaffe GJ.

Collaborators (861)

Abstract

BACKGROUND: Clinical trials have established the efficacy of ranibizumab for the treatment of neovascular age-related macular degeneration (AMD). In addition, bevacizumab is used off-label to treat AMD, despite the absence of similar supporting data.

METHODS: In a multicenter, single-blind, noninferiority trial, we randomly assigned 1208 patients with neovascular AMD to receive intravitreal injections of ranibizumab or bevacizumab on either a monthly schedule or as needed with monthly evaluation. The primary outcome was the mean change in visual acuity at 1 year, with a noninferiority limit of 5 letters on the eye chart.

RESULTS: Bevacizumab administered monthly was equivalent to ranibizumab administered monthly, with 8.0 and 8.5 letters gained, respectively. Bevacizumab administered as needed was equivalent to ranibizumab as needed, with 5.9 and 6.8 letters gained, respectively. Ranibizumab as needed was equivalent to monthly ranibizumab, although the comparison between bevacizumab as needed and monthly bevacizumab was inconclusive. The mean decrease in central retinal thickness was greater in the ranibizumab-monthly group (196 μ m) than in the other groups (152 to 168 μ m, $P=0.03$ by analysis of variance). Rates of death, myocardial infarction, and stroke were similar for patients receiving either bevacizumab or ranibizumab ($P>0.20$). The proportion of patients with serious systemic adverse events (primarily hospitalizations) was higher with bevacizumab than with ranibizumab (24.1% vs. 19.0%; risk ratio, 1.29; 95% confidence interval, 1.01 to 1.66), with excess events broadly distributed in disease categories not identified in previous studies as areas of concern.

CONCLUSIONS: At 1 year, bevacizumab and ranibizumab had equivalent effects on visual acuity when administered according to the same schedule. Ranibizumab given as needed with monthly evaluation had effects on vision that were equivalent to those of ranibizumab administered monthly. Differences in rates of serious adverse events require further study. (Funded by the National Eye Institute; ClinicalTrials.gov number, NCT00583450.)

Comment in

N Engl J Med. 2011 Dec 8;365(23):2237; author reply 2237.
N Engl J Med. 2011 Dec 8;365(23):2238.
N Engl J Med. 2011 May 19;364(20):1966-7.

PMID: 21528923 [PubMed - indexed for MEDLINE] PMCID: PMC3157322 Free PMC Article

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Keywords

Related citations

Bevacizumab for neovascular age-related macular degeneration (ABC Trial): multicentre [BMJ. 2010]
Ranibizumab for neovascular age-related macular degeneration. [N Engl J Med. 2006]
Ranibizumab versus verteporfin for neovascular age-related macular degene [N Engl J Med. 2006]
Review Ranibizumab and pegaptanib for the treatment of age-related macular degeneration [Health Technol Assess. 2008]
Review Ranibizumab: Phase III clinical trial results. [Ophthalmol Clin North Am. 2006]
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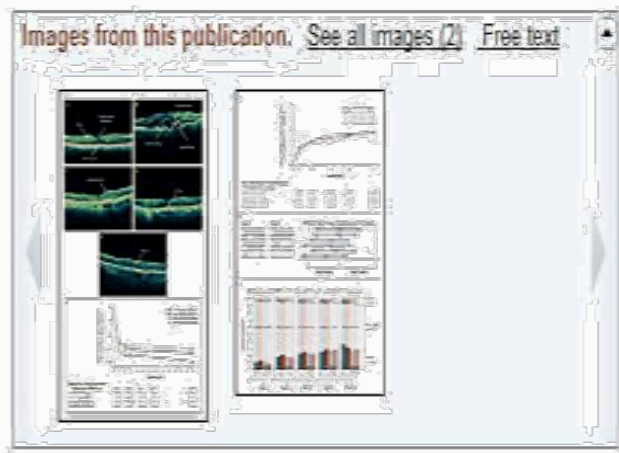
Antivascular endothelial growth factor agents for neovascular age-related macular degeneration [J Ophthalmol. 2012]
Management of neovascular age-related macular degeneration in clinical practice [J Ophthalmol. 2011]
One-year outcomes using ranibizumab for neovascular age-related macular degeneration [J Ophthalmol. 2011]
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PMD: 21526823 [PubMed - indexed for MEDLINE] PMID: PMC3157322 Free PMC Article



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Cited by 52 PubMed Central articles

Establishing equivalence or non-inferiority in clinical trials: part 20 of 2 [Disch Arztebl Int. 2012]

Comparison of Systemic Adverse Events Associated with Intravitreal [J Korean Med Sci. 2012]

Fixed Monthly versus Less Frequent Ranibizumab Dosing and Pro [J Ophthalmol. 2012]

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Search details

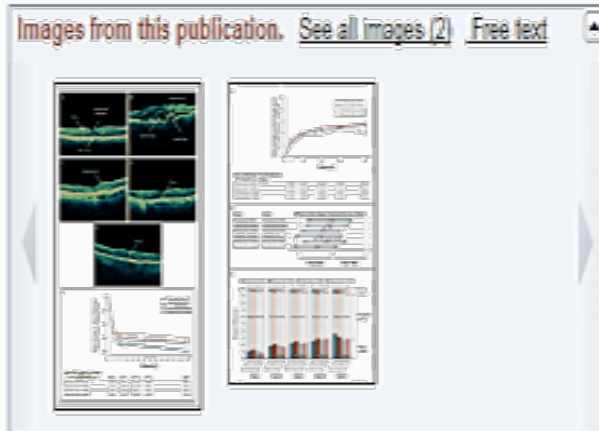
2011[ptat] AND "ranibizumab" AND martin[au]

Search

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Bottom of PubMed Record

PMID: 21526923 [PubMed - indexed for MEDLINE] PMCID: PMC3157322 Free PMC Article



Publication Types, MeSH Terms, Substances, Secondary Source ID, Grant Support

Publication Types

[Comparative Study](#)

[Multicenter Study](#)

[Randomized Controlled Trial](#)

[Research Support, N.I.H., Extramural](#)

MeSH Terms

[Aged](#)

[Aged, 80 and over](#)

[Antibodies, Monoclonal/adverse effects](#)

[Antibodies, Monoclonal/pharmacology](#)

[Antibodies, Monoclonal/therapeutic use*](#)

[Antibodies, Monoclonal, Humanized](#)

[Cardiovascular Diseases/epidemiology](#)

[Drug Administration Schedule](#)

[Female](#)

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[Intention to Treat Analysis](#)

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[Comparison of Systemic Adverse Events Associated with Intravitreal Ranibizumab \[J Korean Med Sci. 2012\]](#)

[Fixed Monthly versus Less Frequent Ranibizumab Dosing and Patient Satisfaction \[J Ophthalmol. 2012\]](#)

[The use of comparative effectiveness research to inform policy \[Clinicoecon Outcomes Res. 2012\]](#)

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- ☐ Summary (text)
- ☒ Abstract
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97-968. Epub 2011 Apr 28.

Ranibizumab for neovascular age-related macular degeneration.

Macuire MG, Ying GS, Grunwald JE, Fine SL, Jaffe GJ.

have established the efficacy of ranibizumab for the treatment of neovascular age-related macular degeneration (AMD). off-label to treat AMD, despite the absence of similar supporting data.

METHODS: In a multicenter, single-blind, noninferiority trial, we randomly assigned 1208 patients with neovascular AMD to receive intravitreal injections of ranibizumab or bevacizumab on either a monthly schedule or as needed with monthly evaluation. The primary outcome was the mean change in visual acuity at 1 year, with a noninferiority limit of 5 letters on the eye chart.

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CONCLUSIONS: At 1 year, bevacizumab and ranibizumab had equivalent effects on visual acuity when administered according to the same schedule. Ranibizumab given as needed with monthly evaluation had effects on vision that were equivalent to those of ranibizumab administered monthly. Differences in rates of serious adverse events require further study. (Funded by the National Eye Institute; ClinicalTrials.gov number, NCT00593450.).

Comment in

N Engl J Med. 2011 Dec 8;365(23):2237. author reply 2237.

N Engl J Med. 2011 Dec 8;365(23):2238.

N Engl J Med. 2011 May 19;364(20):1956-7.

PMID: 21526923 [PubMed - indexed for MEDLINE] PMCID: PMC3157322 Free PMC Article

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Publication Types, MeSH Terms, Substances, Secondary Source ID, Grant Support

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Bevacizumab for neovascular age related macular degeneration (ABC Trial): multicentre [BMJ. 2010]

Ranibizumab for neovascular age-related macular degeneration. [N Engl J Med. 2006]

Ranibizumab versus verteporfin for neovascular age-related macular degene [N Engl J Med. 2006]

Review Ranibizumab and pegaptanib for the treatment of age-r [Health Technol Assess. 2008]

Review Ranibizumab: Phase III-clinical trial results. [Ophthalmol Clin North Am. 2006]

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Management of neovascular age-related macular degeneration in clinical prac [J Ophthalmol. 2011]

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Ranibizumab and bevacizumab for neovascular age-related macular degeneration




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to build your
search strategy

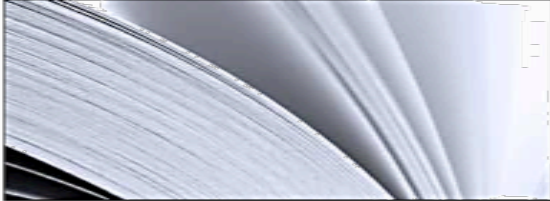


AU - Jaffe GJ
LA - eng
SI - ClinicalTrials.gov/NCT00593450
GR - U10-EY017823/EY/NEI NIH HHS/United States
GR - U10-EY017825/EY/NEI NIH HHS/United States
GR - U10-EY017826/EY/NEI NIH HHS/United States
GR - U10-EY017828/EY/NEI NIH HHS/United States
PT - Comparative Study
PT - Journal Article
PT - Multicenter Study
PT - Randomized Controlled Trial
PT - Research Support, N.I.H., Extramural
DEP - 20110428
PL - United States
TA - N Engl J Med
JT - The New England journal of medicine
JID - 0255562
RN - 0 (Antibodies, Monoclonal)
RN - 0 (bevacizumab)
RN - 0 (ranibizumab)
SB - AIM
SB - IM
CIN - N Engl J Med. 2011 May 19;364(20):1966-7. PMID: 21526924
MH - Aged
MH - Aged, 80 and over
MH - Antibodies, Monoclonal/adverse effects/pharmacology/*therapeutic use
MH - Cardiovascular Diseases/epidemiology
MH - Drug Administration Schedule
MH - Female
MH - Humans
MH - Intention to Treat Analysis
MH - Macular Degeneration/*drug therapy/pathology
MH - Male
MH - Middle Aged
MH - Off-Label Use
MH - Proportional Hazards Models
MH - Retina/drug effects/pathology
MH - Single-Blind Method
MH - Therapeutic Equivalency
MH - Visual Acuity/drug effects
IR - Williams DF
FIR - Williams, David F
IR - Beardsley S
FIR - Beardsley, Sara

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	Proteins	SNP		
	Sequence Analysis	Structure		
	Taxonomy			

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MeSH


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

Using MeSH

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MeSH MeSH macula* degenerat* Search

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Display Settings: Summary, 20 per page Send to:

Results: 19

- ☐ **Macular Degeneration**
1. Degenerative changes in the RETINA usually of older adults which results in a loss of vision in the center of the visual field (the MACULA LUTEA) because of damage to the retina. It occurs in dry and wet forms.
Year introduced: 1973(1975)
- ☐ **Wet Macular Degeneration**
2. A form of RETINAL DEGENERATION in which abnormal CHOROIDAL NEOVASCULARIZATION occurs under the RETINA and MACULA LUTEA, causing bleeding and leaking of fluid. This leads to bulging and or lifting of the macula and the distortion or destruction of central vision.
Year introduced: 2010
- ☐ **Vitelliform Macular Dystrophy**
3. Autosomal dominant hereditary maculopathy with childhood-onset accumulation of LIPOFUSION in RETINAL PIGMENT EPITHELIUM. Affected individuals develop progressive central acuity loss, and distorted vision (METAMORPHOPSIA). It is associated with mutations in bestrophin, a chloride channel.
Year introduced: 2011
- ☐ **Retinal Degeneration**
4. A retrogressive pathological change in the retina, focal or generalized, caused by genetic defects, inflammation, trauma, vascular disease, or aging. Degeneration affecting predominantly the macula lutea of the retina is MACULAR DEGENERATION. (Newell, Ophthalmology: Principles and Concepts, 7th ed, p304)
Year introduced: 1970(1963)

PubMed search builder

Add to search builder AND Search PubMed

Find related data




Database: Select Find items

Search details

(macula[All Fields] OR maculae[All Fields] OR maculalactone[All Fields] OR maculans[All Fields] OR maculasein[All Fields] OR macular[All Fields] OR

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Macular Degeneration 


Degenerative changes in the RETINA usually of older adults which results in a loss of vision in the center of the visual field (the MACULA LUTEA) because of damage to the retina. It occurs in dry and wet forms.
Year introduced: 1979(1975)


PubMed search builder options

[Subheadings](#)


<input type="checkbox"/> blood	<input type="checkbox"/> ethnology	<input type="checkbox"/> prevention and control
<input type="checkbox"/> cerebrospinal fluid	<input type="checkbox"/> etiology	<input type="checkbox"/> psychology
<input type="checkbox"/> chemically induced	<input type="checkbox"/> genetics	<input type="checkbox"/> radiography
<input type="checkbox"/> classification	<input type="checkbox"/> history	<input type="checkbox"/> radionuclide imaging
<input type="checkbox"/> complications	<input type="checkbox"/> immunology	<input type="checkbox"/> radiotherapy
<input type="checkbox"/> congenital	<input type="checkbox"/> metabolism	<input type="checkbox"/> rehabilitation
<input type="checkbox"/> diagnosis	<input type="checkbox"/> microbiology	<input type="checkbox"/> surgery
<input type="checkbox"/> diet therapy	<input type="checkbox"/> mortality	<input type="checkbox"/> therapy
<input type="checkbox"/> drug therapy	<input type="checkbox"/> nursing	<input type="checkbox"/> ultrasonography
<input type="checkbox"/> economics	<input type="checkbox"/> parasitology	<input type="checkbox"/> urine
<input type="checkbox"/> enzymology	<input type="checkbox"/> pathology	<input type="checkbox"/> veterinary
<input type="checkbox"/> epidemiology	<input type="checkbox"/> physiopathology	<input type="checkbox"/> virology

☐ Restrict to MeSH Major Topic

☐ Do not include MeSH terms found below this term in the MeSH hierarchy 

PubMed search builder 

AND


Related information 

PubMed

PubMed - Major Topic

Clinical Queries

NLM MeSH Browser

Recent activity 

Q macula* AND degenerat* (19) MeSH

Q macula* AND generat* (0) MeSH

End of MeSH Term Entry Page

Entry Terms:

- Degeneration, Macular
- Degenerations, Macular
- Macular Degenerations
- Age-Related Maculopathies
- Age-Related Maculopathies
- Maculopathy, Age-Related
- Maculopathy, Age-Related
- Macular Dystrophy
- Dystrophies, Macular
- Dystrophy, Macular
- Macular Dystrophies
- Maculopathies, Age-Related
- Maculopathies, Age-Related
- Age-Related **Macular Degeneration**
- Age-Related **Macular Degeneration**
- Age-Related Macular Degenerations
- Degeneration, Age-Related Macular
- Degenerations, Age-Related Macular
- **Macular Degeneration**, Age-Related
- Macular Degenerations, Age-Related
- Age-Related Maculopathy
- Age-Related Maculopathy

Previous Indexing:

- Retinal Degeneration (1970-1978)

See Also:

- Vitelliform Macular Dystrophy

All MeSH Categories

Diseases Category


Eye Diseases


Retinal Diseases


Retinal Degeneration

Macular Degeneration

Geographic Atrophy

 Macular Degeneration MeSH

 macular degeneration (9) MeSH

 (randomized controlled trial[pt] OR controlled clinical trial[pt]... (2499959) PubMed

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MeSH and Keyword Analysis

	Angiogenesis inhibitors	Antibodies monoclonal	Choroidal neovascularization	Macular degeneration	Visual acuity	Visual fields
CATT		X		X		
Paper 2	X		X			X
Paper 3			X			
Paper 4	X	X			X	X
Paper 5		X			X	

PubMed: Common Field Tags

MeSH	mh
Text word	tw
Title and abstract	tiab
Title	ti
Date	dp
Author	au
Publication type	pt
All fields	all

- http://www.ncbi.nlm.nih.gov.proxy3.library.jhu.edu/books/NBK3827/#pubmedhelp.Search_Field_Description

Add to Search Strategy

- Plurals
 - Acuity, acuities
- Abbreviations
 - CNV for choroidal neovascularization
- Synonyms
 - Lucentis, ranibizumab
 - Avastin, bevacizumab
- Spelling variations
 - Randomized/randomised
- Truncation
 - Antibod* for antibody or antibodies

Impact of Limiting by Language in Systematic Reviews

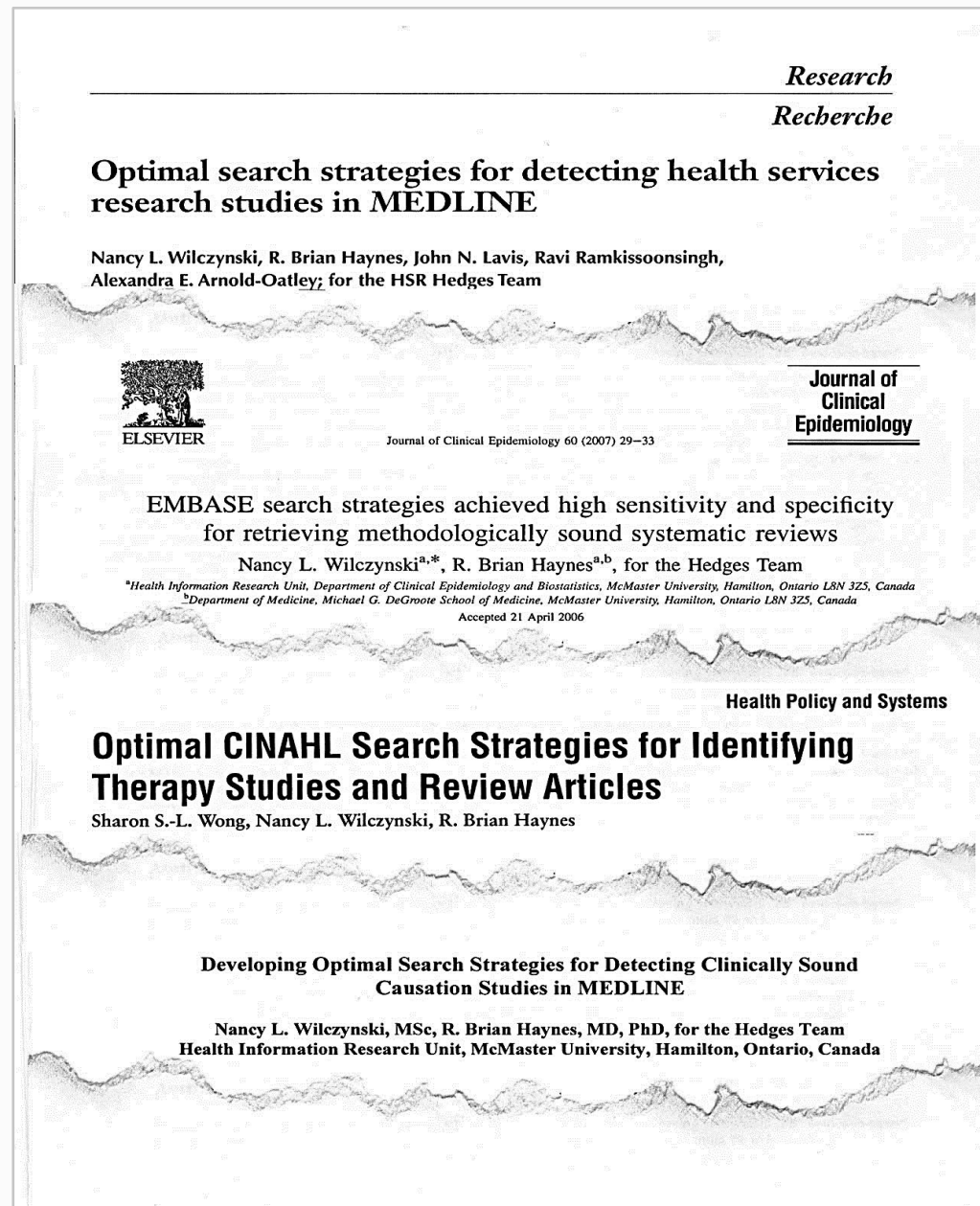
- **Yes**, for German-speaking authors publishing in both languages (Egger, et al., 1997)
- **Yes**, for reports in complementary medicine from China, Russia, and Taiwan (Vickers, et al., 1998)
- **No**, for Cochrane reviews employing comprehensive searches (Juni, et al., 2002)

Cochrane Highly Sensitive Search Strategy for RCTs

- Box 6.4.a: Cochrane Highly Sensitive Search Strategy for identifying randomized trials in MEDLINE: sensitivity-maximizing version (2008 revision); PubMed format
 - (randomized controlled trial [pt] OR controlled clinical trial [pt] OR randomized [tiab] OR placebo [tiab] OR drug therapy [sh] OR randomly [tiab] OR trial [tiab] OR groups [tiab]) NOT (animals [mh] NOT humans [mh])

Searching for Observational Studies

- Useful articles on searching for observational studies



Completed Search Strategy

- This is added to the Cochrane “highly sensitive search strategy”

P ↑
(macular degeneration [mh] OR retinal degeneration [mh] OR retinal neovascularization [mh] OR choroidal neovascularization [mh] OR macula lutea [mh] OR maculopath* [tw] OR ((macul* [tw] OR retina* [tw] OR choroid* [tw]) AND degener*.[tw]) OR ((macul* [tw] OR retina* [tw] OR choroid* [tw]) AND neovasc* [tw]) OR macula* lutea [tw])
↓

AND

I, C ↑
(angiogenesis inhibitors [mh] OR angiogenesis inducing agents [mh] OR vascular endothelial growth factors [mh] (lucentis\$ or ranibizumab\$ or bevacizumab\$) [tw] OR anti VEGF* [tw] OR endothelial growth factor* [tw])
↓

- Add study filter terms to identify study type

Tool: PRESS Checklist

- On the basis of extensive research reviewing 26 different tools for evaluating electronic searches, seven key criteria for assessing search quality have been developed (Sampson, et al., 2008)

Remember to Adapt Your Search

- EMBASE, Cochrane, LILACS, CINAHL, Web of Science
 - All require different search strategies
 - ▶ Sampson and McGowan, 2008

Summary: Searching Process

- Develop your search
 - Based on the defined clinical question
 - Break into concepts (PICO)
 - Find synonyms for terms
- Use Boolean logic:
 - OR synonyms
 - AND concepts
- Use controlled vocabulary when available
 - In PubMed, use MeSH and keywords found in citations to key articles, MeSH database
- Revise the search strategy
- Include tested study design filter if available
- Use PRESS tool to check search strategy

Looking Ahead

- Next section:
 - Documentation and conclusions